FAVOURITE FLOWERS

OF

GARDEN AND GREENHOUSE

NOISETTE ROSE—"WILLIAM ALLEN RICHARDSON"

$^{2}/_{3}$ Nat. size

VOL. II.—Front.

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FAVOURITE FLOWERS

OF

GARDEN AND GREENHOUSE

BY

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THE CULTURAL DIRECTIONS

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ILLUSTRATED WITH

Three Hundred and Sixteen Coloured Plates

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FAVOURITE FLOWERS

OF

GARDEN AND GREENHOUSE

ROSES (*continued*)

Natural Order Rosaceæ. Genus *Rosa*

For the characters of the Genus, history and descriptions of the cultivated kinds, together with lists of hybrids and garden varieties, the reader is referred to vol. i. pp. 149–164.

Rose Enemies. The grower of Roses has to combat the attacks of numerous enemies, not only among insects, but the more insidious depredations of fungoid parasites. Among INSECTS, various species of Greenfly (*Aphis*) are most in evidence, swarming in thick masses round the extremity of the growing shoots, and sucking sap continually. This constant drain upon the tenderest portions of the plant has a prejudicial effect upon the character of the branches formed from these shoots, and an effort must be made to get rid of the pests. Whatever is attempted in this direction must be thorough, for the fecundity of the *Aphis* is so astonishingly great and rapid, that a single individual left upon a Rose-tree is sufficient to ensure a swarm round every shoot a day or two later. Many remedies are in use, such as solutions of tobacco, quassia, soft soap, and numerous patent preparations. All these are good, but in using them care must be taken to thoroughly syringe the plants a few hours later with clean water, or the remedy will prove worse than the disease. Our own experience is

that when the succulent growing tips of the branches have been much attacked by these pests, they do not develop into healthy wood, and that the heroic remedy is the best—that is, to cut off the infested shoots and put them on the fire at once. That is a certain end to the insects, whereas many of the washes merely stupefy for the time, and the Greenfly revive to found new colonies. But not only does the *Aphis* injure Roses by its direct attacks, its sticky secretions provide a suitable material in which the low fungus *Capnodium* may flourish. Although this does not appear to attack the tissues of the Rose, its growth is unsightly, and clogs the breathing pores of the plant. The Lace-wing fly (*Hemerobius*) and the Lady-bird (*Coccinella*) should be encouraged, for their larvæ live entirely by sucking Greenfly dry. The larvæ of various species of Saw-fly (*Tenthredo*) and of moths innumerable feed upon the leaves, and these must be got rid of by hand-picking, which is at once more efficacious and more economical than the application of washes to the leaves, and of sticky messes to the stems. Several species of beetle, like the beautiful Rose-chafer (*Cetonia*) and the Bracken-clock (*Phyllopertha*), feed upon the pollen and stamens of the flower, but beyond picking them off when seen, little can be done with these minor pests, for they are constantly on the wing.

FUNGUS PESTS are in a measure more serious, for we believe that it may be regarded as a general principle that these owe their presence to some unhealthy condition of the part attacked, perhaps of the whole plant. It would be foreign to the purpose of this work to enter into details of description or treatment for these various enemies, but the grower may be recommended to keep an eye open for the early stages of these parasites, usually evidenced by discoloured spots or patches on the leaves, and to remove the affected part at once, burning it if it is not wanted for microscopical examination. In this way he will have done his best to prevent the mischief spreading, but at the same time what he has seen should lead him to fully examine the plant and see if there is anything conducive to such attacks either in defective drainage, unsuitable position, bad soil, etc. Powdered sulphur and weak solutions of potassium sulphide are recommended as cures or palliatives, but if the cause lies—as we believe is generally the case in fungus attacks—in an unhealthy condition of the tree, the soundest treatment is to cut out the diseased part and try to improve the health of the organism as a whole.

Description of Plates 79 to 84. Plate 79 represents the extremity of a flowering shoot of *Rosa multiflora*, the appropriately named Many-flowered Rose, reduced by about one-fourth from the natural dimensions.

MANY-FLOWERED ROSE

(ROSA MULTIFLORA)

3/4 Nat. size

PL. 79

Fig. 1 is a section through the flower, and Fig. 2 shows the comb-like stipules at the base of the leaf-stalk, and the paired hook-prickles below. It occurs also with rosy and purple flowers.

Plate 80 illustrates one of the numerous forms of *R. indica*, the var. *semperflorens* or Monthly Rose, with solitary flowers at the tips of the branches. The figure is about one-half the natural size.

Plate 81 is a drawing of *R. lutea*, var. *punicea*, the Austrian Briar, or Nasturtium Rose (Rose Capucine), so called on account of the resemblance in colour to the flowers of *Tropæolum*. Fig. 1 is a section through the flower after the fall of the petals.

Plate 82 shows a flower and buds of *R. centifolia*, var. *muscosa*, the Moss Rose, with its shaggy calyx and unequal prickles. The remarkable stipules are also well represented.

Plate 83 is a reduced drawing of the Hybrid Perpetual *Baroness Rothschild*, about one-half of the natural size.

Plate 84 gives further representation to the class of Hybrid Perpetuals in *General Jacqueminot*, drawn of the natural size.

In the Plate which forms the frontispiece to the present volume of this work, there will be found a representative of the Noisette section of Roses — *William Allen Richardson*, a hybrid of recent production, but already a great favourite.

KERRIA

Natural Order Rosaceæ. Genus *Kerria*

Kerria (named in honour of W. Kerr, a botanist of last century). A genus of only one or two species of shrubs, native of China. *Kerria japonica* is frequently cultivated on account of its handsome orange-yellow flowers, abundantly produced at almost all seasons. It is an erect-growing plant, 5 or 6 feet high, with slender dark-green branches, and bright green, smooth, alternate leaves, which are oval-lance-shaped, sharply and doubly toothed. The flowers are of similar structure to those of *Spiræa*, with five petals and numerous stamens. But the form almost solely cultivated in this country is the double variety, *flore pleno*. The flowers are produced singly at the end of little side-shoots all along the upright branches, and are about an inch and a half across. It was introduced about the year 1700.

Cultivation. *K. japonica* (Japanese) is usually trained against walls. It succeeds in any good loamy soil, and is repro-

duced by means of cuttings taken from the young shoots. These are usually struck under a hand-light, but in many districts they will strike quite well if merely inserted where it is desired to grow them. Many years ago, noting the abundance of *Kerria* in the cottage-gardens of a village among the Surrey sandhills, we asked the sexton what it was. "Oh," said he "it's just the Japonica. You just break off a bit and stick it in, and it grows." Such was the rough method in practice there, but it was highly successful, and *K. japonica* flourished in every garden. It may also be propagated by layering the branches, or by dividing the plants. There is another variety (*foliis variegatis*) in which the leaves are prettily variegated with several shades of white, yellow, and green. *Kerrias* are sometimes referred to as members of the genus *Corchorus*, but quite erroneously; the latter belonging to the Natural Order TILIACEÆ.

WHITE KERRIA

Natural Order ROSACEÆ. Genus *Rhodotypos*

RHODOTYPOS (Greek, *rhodon*, a rose, and *typos*, a type or model). A genus comprising but one species, closely allied to and resembling *Kerria*, on which account it is called *Rhodotypos Kerrioides* (*Kerria*-like). It differs from *Kerria*, however, in the calyx lobes and the petals being four in each case, and the carpels one to four instead of five to eight. It is a tall-growing shrub, about 15 feet high, with both branches and leaves in fours (*decussate*). The flowers are white, terminal and solitary, appearing in April. The plant was introduced from Japan in 1866. For cultivation, see *Kerria*.

BRAMBLES

Natural Order ROSACEÆ. Genus *Rubus*

RUBUS (the old Roman name, derived from *ruber*, red). A genus comprising about a hundred species of generally twiggy and prickly, trailing shrubs, of which our native Bramble or Blackberry (*Rubus fruticosus*) may be taken as the type. They have conspicuous five-petaled flowers, white or pink, grouped in panicles or corymbs; and leaves simple or compound. They are chiefly grown for the sake of the multiple fruits, which are in many species juicy and edible. Several species, however, are grown for the flowers or ornamental foliage, and it is only with these

MONTHLY ROSE

(ROSA INDICA—*var. semperflorens*)

1/2 Nat. size

PL. 80

that we are at present concerned. The species are abundant in the Northern Hemisphere, and a few occur in the Southern.

Principal Species.

RUBUS BIFLORUS (two-flowered). Chiefly grown on account of its pure white stems and branches, which are tall and covered with strong, recurved prickles. The leaves are broken up into three or five oval leaflets, which are inclined to be lobed, are doubly-toothed, downy above and covered with white wool beneath. The flowers are white, in axillary clusters of two or three; May. Fruit large, globose, golden yellow. Introduced from temperate Himalaya (1818). This has a very ornamental appearance when trained up a dark-coloured wall.

R. LACINIATUS (torn). Stems nearly round, straggling, well armed; prickles with dilated base. Leaves divided into three or five deeply-dissected leaflets. The flowers are white or rosy, in loose panicles; the petals three-lobed at the apex; June to September. Fruit large, black. This species, variety, or hybrid, which is of garden origin, and its true relationships unknown, is a very ornamental subject for scrambling over a fence or tree-stump. It may even be planted in a bed by itself and given a few tree-roots to grow around.

R. ODORATA (fragrant). Stem erect, 3 to 5 feet high, devoid of spines, but covered with purple, glandular bristles. Leaves lobed, minutely toothed. Flowers rosy purple, 2 inches across; petals rounded; June to August. Fruit reddish, flat and broad. Introduced from North America (1700).

R. ROSÆFOLIUS (Rose-leaved). Stems erect, or nearly so, with scattered hooked prickles. Leaflets, five or seven, oval-lance-shaped, doubly and deeply toothed. Flowers white, solitary or in loose panicles; August. Fruit orange-red. Himalaya (1811).

R. SPECTABILIS (showy). Salmon Berry. Stem erect, 5 to 10 feet high, unarmed or spiny. Leaves three-lobed, or divided into three egg-shaped leaflets, saw-toothed. Flowers very large, bright red, produced solitarily or in pairs, from the axils; May. Fruit egg-shaped, large, red. Introduced from North America (1827).

Cultivation.

Most *Rubi* are hardy, although even our tough Blackberry (*R. fruticosus*) occasionally receives a severe check through late frosts in early summer. Most garden soils will be found suitable for them, the chief care needed being to keep them within bounds by judicious cutting-back. They may be propagated from seed, by layering the lower shoots, or by pegging down the tips of the long, arching ones, and covering slightly with earth. They soon root, and may then be separated and re-planted.

ALMOND, PLUM, AND CHERRY TREES

Natural Order Rosaceæ. Genus *Prunus*

Prunus (the old Roman name for the Plum-tree). A genus comprising about eighty species of shrubs or trees with simple alternate leaves, white or red flowers, which are honeyed and disposed in corymbs, or racemes, or produced solitarily. There are five lobes to the calyx, five petals, fifteen to twenty stamens, and a single carpel. The species are natives of the Northern temperate regions, and rare in the tropics. Four species are indigenous to Britain. Most of the species are cultivated for the sake of the juicy fruit (Plums, Peaches, Cherries, etc.); those mentioned below are suggested on account of their showy flowers.

History. The genus *Prunus* includes some of the most anciently cultivated of plants. Respecting the origin of some of these, such as the Almond, the Peach, and the Apricot, there has been much dispute. Persia and Northern Africa were formerly considered to be the natural home whence these desirable fruits have spread; but the generally accepted belief of modern botanists is that the Peach and Apricot are natives of China, and the Almond is indigenous to Southern Europe and the Levant. The Almond (*P. Amygdalus*), cultivated from very early periods, came to us by way of North Africa at some date prior to 1548, and somewhere about the same period we introduced the Apricot (*P. Armeniaca*) from the Levant. Of the Peach (*P. Persica*) we have no certain records earlier than 1562; it appears to have come to us from Persia, where it had then been in cultivation for at least twelve hundred years, for Theophrastus in B.C. 322 speaks of it as a Persian fruit, and it is suggested that he became acquainted with it through Alexander's expedition to Persia. The Almond is only grown in this country for the sake of its flowers, but on the Continent for its fruit; in favourable seasons it ripens these in the South of England.

Principal Species. Prunus Amygdalus (Almond). Almond-tree. A tree, from 10 to 30 feet high, with oblong-lance-shaped leaves, finely toothed. Flowers pink or rosy (sometimes white), produced in abundance before the leaves, in March. During a mild winter they sometimes appear in February, and rarely ever in January. The fruit is covered with a downy fibrous husk. There are several varieties.

P. Armeniaca (Armenian). Apricot. A tree about 15 feet high, with egg-shaped or heart-shaped, smooth leaves, glandularly toothed.

AUSTRIAN BRIAR

(ROSA LUTEA—*var. punicea*)

Nat. size

PL. 81

Flowers pinkish white, stalkless; February or March. Fruit fleshy, covered with a velvety skin.

P. AVIUM (bird). Gean or Wild Cherry. Tree, 20 to 40 feet high, with stout trunk, and stout rigid branches curving upwards. Leaves pale green, downy beneath, on long stalks, and hanging down. Flowers in small umbels, drooping, the soft petals widely spreading; April or May. Fruit somewhat heart-shaped, black or red, bitter or sweet, but not acid; juice staining. Native.

P. CERASUS (supposed native of Cerasus, in Pontus). Dwarf Cherry. A bush or dwarf tree, 6 or 8 feet high, with red bark, numerous suckers, slender drooping branches, and smooth, blue-green, coarsely-toothed leaves with short stalks. The flowers erect, in small umbels; the firm white petals notched, and not spreading widely; April or May. Fruit round, red, with acid juice. A native.

P. LAUROCERASUS (Cherry Laurel). Common Laurel or Cherry Laurel. A fine evergreen foliage shrub or tree, 6 to 10 feet high, with large, glossy, oval-lance-shaped leaves, dull beneath. The flowers in an erect raceme shorter than the leaves; April and May. Introduced from the Levant (1629). A number of varieties are to be found in our shrubberies, the chief differences being in the size or shape of the leaves. Var. *latifolia* is probably the best.

P. LUSITANICA (Portuguese). Portugal Laurel. Evergreen shrubs 10 to 20 feet high, with oval-lance-shaped leaves, and white flowers in erect axillary racemes, longer than the leaves; June. Introduced from Portugal (1648). The var. *myrtifolia* has small leaves, and is of more compact growth.

P. PERSICA (Persian). Peach. Tree, 15 feet high, with smooth, lance-shaped, saw-toothed leaves, and pale or dark red flowers, smaller than those of *P. Amygdalus*, appearing in April or May. Fruit fleshy, covered with a velvety skin. The var. *lævis* (Nectarine) has firmer, plumper fruit with smooth skin.

P. TRILOBA (three-lobed). Shrub, about 6 feet high, with three-lobed leaves. Flowers large, white or rosy, generally double, appearing before the leaves; March. Introduced from China (1857).

Cultivation. On a well-drained loamy soil all the species of *Prunus* will do well. Their roots run very near the surface, and, consequently, so deep a soil is not required as by many shrubs and trees of equal size. With some species there is a strong disposition to throw up numerous suckers, which are often a nuisance, and must be taken off. It is not advisable to use these suckers for propagation. Stocks for budding or grafting are usually raised from seed, which should be sown

as soon as ripe. The flowers are produced on short spurs at the end and along the sides of well-ripened shoots of from one to three years old. In pruning, these must be preserved uncut when the weak and unripened wood is cut away in winter.

APPLE AND PEAR TREES

Natural Order Rosaceæ. Genus *Pyrus*

Pyrus (the old Roman name for the Pear-tree). A genus of trees or shrubs comprising about forty species, with simple or pinnate leaves, and white or pink, honeyed flowers, in terminal cymes or corymbs. The flower-parts agree in number with those of *Prunus*, and are similar in appearance; but there are from two to five carpels. The fruit as a whole, too, is inferior to the calyx, that is, the calyx is above it. The carpels instead of being stony as in *Prunus* are here only bony, and are surrounded by the ovary and the enlarged calyx-tube, both filled with a fleshy pulp. The species are natives of the north temperate and Arctic regions; five being British.

History. Like *Prunus*, the genus *Pyrus* has been cultivated for the sake of its fine fruits from very early times. The Romans are believed to have brought cultivated Apples with them when they took possession of these islands. But that is a matter with which we are not much concerned, for there is no doubt they found the Crab or Wild Apple (*P. Malus*), and other species here, and from the florist's point of view, though not from the pomologist's, the Crab in blossom is as beautiful a sight as may be afforded by such varieties as produce fruit ten times its size. Having our native species, with their numerous cultivated varieties, our forefathers prior to the eighteenth century do not appear to have troubled about the introduction of new species of Apple or Pear. It is true that long anterior to the year 1573 *P. Cydonia*, the Quince, made its first appearance, being introduced from Austria, though its native country still remains unknown. Then in this genus we meet with no fresh importations of moment until 1724, when *P. coronaria*, the Sweet-scented Crab, appeared from Virginia. In 1758 *P. prunifolia*, the Siberian Crab, was introduced, and in 1784 *P. baccata* also came from Siberia. The fine, showy-flowered *P. spectabilis* is a native of China and Japan, and from the former country we received it in 1780. The favourite *P. japonica*, which flowers nearly all the year round, we introduced in 1815, and the very beautiful *P. Maulei*, also from Japan,

MOSS ROSE

(ROSA CENTIFOLIA—*var. muscosa*)

Nat. size

PL. 82

has been known in English gardens little more than twenty years. Although most of these species produce edible fruit, they are mentioned here solely on account of their ornamental characters.

Principal Species.

PYRUS ARIA. White Beam-tree. A bush or tree varying from 4 to 4 feet in height, with variable leaves, jagged at the edges or deeply lobed, smooth above, white and woolly beneath. Flowers, white, ½-inch across in flat corymbs; May and June. Fruits miniature apples, ½-inch across, rich scarlet. Native.

P. AUCUPARIA (fowler's). Rowan or Mountain Ash. A tree, from 10 to 40 feet high, with long leaves broken up into lance-shaped, toothed leaflets, of which there are from six to eight pairs and an odd one. The flowers are creamy white, ⅓-inch across, in dense-flowered compound cymes, 5 or 6 inches across; May and June. Fruit small, globose, scarlet, in conspicuous bunches. The Rowan in full fruit is highly ornamental. Native.

P. BACCATA (berried). Cherry Crab. A tree, 15 to 20 feet high, with smooth egg-shaped, toothed leaves, and white flowers; April and May. Fruit cherry-like, yellow tinged with red. Native of Northern Asia from Himalaya to Japan.

P. COMMUNIS (common). Wild Pear. A tree, from 30 to 70 feet high, generally of pyramidal form, with thorny branches, and egg-shaped toothed leaves, in bunches on the old wood, singly on the new shoots. The flowers are white, from 1 to 1½ inch across, in simple cymes; April and May. Native.

P. CORONARIA (garland). Sweet-scented Crab; American Crab. A small tree, about 20 feet high, with egg-shaped, irregularly toothed or lobed, smooth leaves, and large, rosy-tinted, fragrant flowers in small corymbs; May. Fruit small, fragrant, greenish. Native of Eastern United States.

P. CYDONIA (supposed native of Kydon in Crete). Quince. A tree, 20 feet high, with crooked branches, and egg-shaped, entire leaves, white and woolly beneath. Flowers white or pale red, large and few, in an umbel; May or June. Fruit varying apple or pear-shaped, of a fine golden yellow when ripe.

P. FLORIBUNDA (free-flowering). A highly ornamental shrub, with slender shoots, and small lance-shaped, toothed leaves. Flowers abundant, rich, rosy red; May. Fruit very small, long-stalked. Japan.

P. JAPONICA (Japanese). Japanese Quince. A shrub, 5 or 6 feet high, with smooth, oval leaves, and deep scarlet flowers, produced in pairs or threes, in winter before the leaves, and almost throughout the year. Fruit fragrant, green; not edible. One of the finest of hardy shrubs whether grown on the wall, or as a bush.

P. MALUS (Apple-tree). Crab Apple. Shrub or small tree, 20 feet high,

with spreading branches and oblong leaves. Flowers, 1½ inch across, white delicately tinged with pink, rosy beneath, in umbels; May. Native.

P. MAULEI (Maule's). Shrub, smaller and more compact than *P. japonica*, with bright red flowers; April. Introduced from Japan (1874).

P. PRUNIFOLIA (Plum-leaved). Siberian Crab. Small tree, 20 to 30 feet high, with egg-shaped, smooth, toothed leaves, similar to those of the Cherry; long-stalked. Flowers white, resembling those of *P. communis*; stalks downy; April and May. Fruit yellowish, but bright red on side exposed to sun.

P. SORBUS (Service-tree). The True Service. A tree, 20 to 60 feet high, similar to *P. aucuparia*, but larger. Leaves pinnate, but leaflets equal in size, woolly beneath, toothed towards the points. Flowers creamy, in panicles; May. Fruit larger than those of *P. aucuparia*, more pear-shaped, 1 inch long, dotted with red. Europe.

P. SPECTABILIS (worthy of note). Chinese Crab. A tree, 20 to 30 feet high, with smooth, oval-oblong, toothed leaves, and large, rosy or white flowers; April or May. Fruit spherical, 1 inch across, on long stalks. The var. *alba plena* has double white flowers.

Cultivation. A rich loamy soil, with a subsoil of an open character, is the most suitable for the genus *Pyrus*; they will not succeed where the subsoil is clay. The *species* may be grown from seeds, which should be carefully selected from good healthy trees. *Varieties* should be propagated by means of buds or grafts. Cuttings may also be struck, but it is neither a reliable nor a speedy method; yet we have seen very good results from the mere careless sticking-in of apple branches, without any art being practised. Most of these trees root near the surface, therefore they require mulchings of manure in summer; the Pear, however, roots deeply, and is likely to find its way into some unsuitable strata, and in consequence it is usually grafted on a Quince stock. Of course, where fine fruit is desired, more elaborate instructions are needed; but to keep up the ornamental character of these trees for floral uses the chief requirements are, to see to the renewal of the food for the roots, the judicious pruning of the branches, and cutting out old wood.

THORNS

Natural Order ROSACEÆ. Genus *Crataegus*

CRATÆGUS (Greek, *kratos*, strength). A genus comprising about fifty species of shrubs and small trees, often spiny, with simple, lobed or

ROSE—"BARONESS ROTHSCHILD"
(HYBRID PERPETUAL)
1/2 Nat. size
PL. 83

pinnately cut leaves, and red or white flowers. These are grouped in corymbose cymes, and consist of a pitcher-shaped or bell-shaped calyx with a contracted mouth and five spreading lobes; five petals inserted at the mouth of the calyx; many stamens, and one to five carpels. The latter are below and attached to the calyx-tube, and in association with it they develop into an egg-shaped or globose fruit consisting of a bony stone containing the seed or seeds, invested with a thin layer of flesh and a thick, coloured rind. They are natives of the northern temperate regions, and are chiefly found in America, extending south as far as New Granada. The generic name refers to the hard, strong wood.

Principal Species.

CRATÆGUS COCCINEA (scarlet). A small tree, 20 to 30 feet high, sometimes with a few straight thorns, and heart-shaped, sharply-toothed, smooth leaves. Flowers white, with red anthers; May. Fruit large, egg-shaped, bright coral-red. Introduced from the United States (1683).

C. CRUS-GALLI (cock's-spur). Cockspur Thorn. Shrub or small tree, 10 to 30 feet high, beset with strong *curved* spines. Leaves oval-wedge-shaped, shining, shortly stalked. Flowers large, white, tinged with red, anthers red; May. Fruit bright red, showy, edible. Introduced from North America (1691). There are several good varieties.

C. DOUGLASII (Douglas'). Shrub, 10 to 15 feet high, with reddish twigs and straight, rigid spines. Leaves oval, shining, wedge-shaped at base, doubly toothed. Flowers white; May. Fruit small, dark purple. Introduced from Western North America (1827).

C. FLAVA (yellow). Small tree, 12 to 20 feet high. Leaves egg-shaped, slightly lobed and round toothed, wedge-shaped at base. Flowers mostly solitary, white; May. Fruit pear-shaped, yellow, edible. Introduced from South-East United States (1724).

C. HETEROPHYLLA (various-leaved). Small tree, 15 to 20 feet high, with smooth leaves, somewhat three-lobed at the apex, slightly toothed. Flowers white, in many-flowered corymbs; May. Introduced from the Orient (1816).

C. ORIENTALIS (oriental). Small tree, 12 to 20 feet high, with woolly branches, and deeply-toothed, three-lobed leaves. Flowers white; May and June. Introduced from the Orient (1810).

C. OXYACANTHA (sharp-spined). Whitethorn, Hawthorn, or May. Small tree, 15 to 20 feet high, very spiny. Leaves egg-shaped, with wedge-shaped base, with three or more lobes, shining. Flowers white, produced abundantly, usually sweet-scented, but occasionally unpleasant; May or June. Fruit, dark red or yellow, mealy, edible, but uninviting.

Native. There are very many varieties, of which the dark red flowered *rosea superba* is the most popular.

C. PYRACANTHA (pyramidal-spined). Evergreen Thorn. Shrub, 10 to 15 feet high, with small evergreen, lance-shaped, saw-toothed leaves, and white or pinkish flowers; May. Fruit orange-scarlet, in dense clusters, which remain on the tree almost throughout the winter. There is a variety with white berries. Introduced from Southern Europe (1629).

C. TANACETIFOLIA (Tansy-leaved). Small tree, 10 to 15 feet high, with deeply-lobed, downy leaves, and white flowers; May. Fruit globose, greenish yellow. Introduced from the Orient (1789).

Cultivation. Thorns are most commonly used for hedging, and there is nothing better for the purpose; much of the beauty of our country in spring is due to this use. But Thorns that are allowed to develop naturally and form a round head are a magnificent sight when covered with their snowy blossoms. They thrive in almost any soil, light or heavy, and will survive any ill-treatment. Whether grown as hedge, bush, tree, or choice pot-plant, the flowers come freely. They may be raised from seeds or cuttings, and the special varieties grafted or budded upon vigorous stocks of the common species. The seeds may be sown in drills or furrows, in well dug soil. This may be done soon after the seeds are ripe, or in the following spring; the drills being made about an inch and a half deep. For raising on a large scale, it is advisable to make a little heap of the "haws" soon after they are ripe, in order to root away the fleshy portion; they are then mixed with sand and buried at a depth of five or six inches, where they are left till the next autumn, and then sown. They do not germinate rapidly, and a succession of young plants may be raised from the one sowing for several years. The seedlings are removed when about a year old, the roots shortened with a sharp knife, and transplanted in their permanent stations. They may be trained over walls, grown as standards, or kept for several years as pot-plants.

PHOTINIAS

Natural Order ROSACEÆ. Genus *Photinia* (including *Eriobotria*)

PHOTINIA (Greek, *photeinos*, shining, from the laurel-like leaves). A small genus of half-hardy evergreens with handsome leathery, alternate leaves, and numerous small white flowers in terminal panicles or corymbs. The calyx is top-shaped or bell-shaped, with five lobes.

ROSE—"GENERAL JACQUEMINOT"

(HYBRID PERPETUAL)

Nat. size

PL. 84

There are five spreading petals and about twenty stamens. The fruit is more or less egg-shaped, in some species edible; the cells not bony as in *Crataegus*. There are about a dozen species, natives of the mountainous regions of India, China, Japan, and California.

Principal Species.

PHOTINIA ARBUTIFOLIA (Arbutus-leaved). Californian May-bush. A tree, from 10 to 20 feet high, with oblong-lance-shaped, saw-toothed leaves, and panicled white flowers; July. The leaf-stalks and young branches are bright red. Introduced from California (1796).

P. JAPONICA (Japanese). Loquat, or Japanese Medlar. A tree, from 10 to 20 feet high, with large oblong, wrinkled leaves, downy beneath. Flowers white, in drooping racemes; November. Fruit oval, "the size of a small apple," pale orange tinged with red, of a sub-acid flavour not unlike that of an apple; ripening in spring or early summer. The tree is sufficiently hardy to withstand our ordinary winters out of doors, but one of extra severity kills. Owing to the late flowering period the fruit cannot be ripened out of doors, but as a pot-plant in the stove it ripens easily. Introduced to Kew from China (1787).

P. SERRULATA (toothed). Chinese Hawthorn. A tree, 10 to 20 feet high, with large oblong, toothed leaves, and small white flowers in flat terminal corymbs; April to July. Introduced from China (1804).

Cultivation.

Photinias are well suited for training against walls outside, where they can be given slight protection in very severe weather. They should in any case be given a sheltered position, and a light loamy soil. Propagation is effected by means of cuttings, or by grafting upon stocks of *Pyrus Cydonia*. The cuttings should be taken about three inches long from the side-shoots, inserted in sandy soil and covered with a bell-glass. Grafting is practised for out-door growth, and the method adopted is that known as cleft-grafting. April is about the best time for the operation, and the graft should be contrived as near the ground as possible.

INDIAN HAWTHORN

Natural Order ROSACEÆ. Genus *Rhaphiolepis*

RHAPHIOLEPIS (Greek *rhaphis*, a needle, and *lepis*, a scale, in allusion to the slender bracts). A genus containing about five species of hardy or half-hardy evergreen shrubs or trees, allied to *Photinia*. They have

alternate, leathery, stalked leaves, and white or red flowers in racemes or panicles. The calyx is funnel-shaped, with five awl-shaped lobes, which fall away when the flower withers. The petals are clawed, five in number, oblong; stamens numerous. Fruit, a pulpy berry, with one or two cells. They are natives of China and Japan.

Principal Species.

RHAPHIOLEPIS INDICA (Indian). Indian Hawthorn. A half-hardy shrub, 4 feet high, with egg-shaped or lance-shaped leaves. Flowers white or pinkish, as large as those of *Cratægus Oxyacantha*, in short, terminal panicles; February to August. Introduced from China (1806). There are several varieties which are usually regarded in our greenhouses as distinct species; *rubra* has reddish flowers; *phœostemon* has white flowers with brown stamens; *salicifolia* has white flowers and slender lance-shaped, willow-like leaves.

RH. JAPONICA (Japanese). Hardy shrub, 6 to 10 feet high, with glossy, dark green, oval leaves apparently in whorls at the ends of the branches. Flowers pure white, $\frac{3}{4}$-inch across, fragrant, in erect terminal panicles; June. Introduced from Japan (1865).

Cultivation.

Rhaphiolepis should be grown in a compost of loam, peat, and sand. They form beautiful subjects for greenhouse culture, and *Rh. japonica* stands our ordinary winters out of doors, but it is advisable to grow it against a south wall, and in the event of very severe weather to cover it with mats. The Japanese plant it with *Azaleas* as well as singly. Either species may be propagated from cuttings, which are made from the ripened wood, and struck in sand under a bell-glass.

AMELANCHIERS

Natural Order ROSACEÆ. Genus *Amelanchier*

AMELANCHIER (the name applied to the Medlar in Savoy). A genus of four or five species of hardy shrubs or small trees, with alternate, deciduous, toothed leaves, and white flowers in racemes. The lobes of the calyx do not fall off as in *Rhaphiolepis*, and the fruit is three- to five-celled. The species are natives of the Mediterranean region, Japan, and North America. *A. vulgaris* has been grown in British gardens for at least three hundred years; and is esteemed for the fine appearance of its flowers in spring and the autumnal tints of its foliage, more than for its edible, though not particularly palatable, fruit.

SILVERY CINQUEFOIL

(POTENTILLA ATROSANGUINEA)

½ Nat. size

PL. 85

Principal Species.

AMELANCHIER CANADENSIS (Canadian). Grape Pear. A small tree, 6 to 8 feet high, with oblong-elliptic leaves, ending in a sharp point, and a profusion of white flowers; April. The fruit, which is small and sparingly produced, is purplish in colour, of a pleasant flavour, ripening in June. Introduced from Canada (1746). There are several varieties generally regarded in gardens as distinct species.

A. VULGARIS (common). Common Amelanchier. A shrub, from 3 to 9 feet high, with roundish-oval leaves, and abundant white flowers; April. Fruit dark purple. Introduced from Europe about 1596.

Cultivation.

Amelanchiers may be grown without difficulty in a rich loamy soil, out of doors. They are propagated by seed sown as soon as ripe; by layering the lower shoots; by taking cuttings in autumn; or by grafting in spring upon stocks of Quince or Hawthorn.

COTONEASTERS

Natural Order ROSACEÆ. Genus *Cotoneaster*

COTONEASTER (the old Roman name, signifying Quince-like). A genus comprising about fifteen species of hardy shrubs or small trees, with leathery, often downy, leaves, and small white or pink flowers, which are solitary, or grouped in few-flowered cymes. The calyx-tube is top-shaped or bell-shaped, with five persistent lobes. Petals five; stamens numerous, inserted at the mouth of the calyx; carpels two to five, and fruit small, with two to five bony stones. The species are natives of Europe, temperate Asia, North Africa, and Mexico. *C. vulgaris* occurs in Britain, but only on the limestone cliffs of the Great Orme's Head, in Carnarvonshire.

Principal Species.

COTONEASTER AFFINIS (a cousin). A shrub, about 4 feet high, with lance-shaped leaves and pinkish flowers in large cymes; April and May. Fruits of an intense scarlet hue, remaining on the plant well through the winter. Introduced from Himalaya (1820).

C. BUXIFOLIA (box-leaved). A small shrub, 3 or 4 feet high, with elliptic evergreen leaves, woolly beneath. Flowers white, rather large, in two- to six-flowered cymes; April and May. Berries scarlet. Introduced from Himalaya (1824).

C. FRIGIDA (cold). Shrub or small tree, 10 feet high, robust growing. Leaves oblong-lance-shaped, woolly beneath; sub-evergreen. Flowers white, in many-flowered, woolly cymes; April and May.

Berries scarlet, in large clusters, forming the chief attraction of this species. Himalaya (1824).

C. MICROPHYLLA (small-leaved). Evergreen shrub, 3 to 4 feet high, with trailing branches. Leaves egg-shaped, smooth above, downy or woolly beneath. Flowers white, mostly solitary; April and May. Berries dull red. Himalaya (1824).

C. SIMONSII (Simons'). Sub-evergreen shrub, with rhombic-orbicular leaves, smooth above, silky beneath, persisting through mild winters. Flowers white, few together, or solitary, on short lateral branches; April or May. Berries oblong, bright vermilion, persisting through winter. Introduced from Himalaya.

C. THYMIFOLIA (Thyme-leaved). Evergreen shrub, less than 1 foot high. Leaves egg-shaped, silvery white beneath. Flowers small, pinkish; April. Fruits scarlet. Himalaya (1852).

C. VULGARIS (common). Erect shrub, 3 to 5 feet high, with broad, elliptic-oblong leaves, downy beneath. Flowers small, pink, in few-flowered cymes; May and June. Berries shining red. Rare native.

Cultivation. All the species of *Cotoneaster* are worthy of cultivation, though we have been unable to enumerate them all. They succeed in ordinary garden soil, and may be propagated in the manner suggested for *Amelanchier* (which see). *C. microphylla*, according to Lindley, is evergreen in the severest winters; it should be grafted standard-high on Hawthorn stocks, and grown against a wall, which it will cover as rapidly as Ivy. *C. affinis* and *C. frigida* are useful as stocks upon which to graft the evergreen species.

CINQUEFOILS

Natural Order ROSACEÆ. Genus *Potentilla*

POTENTILLA (Latin, *potens*, powerful, from their former exaggerated medicinal reputation). A genus of about one hundred and twenty species, mostly perennial herbs, and a few shrubs. The leaves are always compound, with stipules growing to the base of the leaf-stalk. In nearly all species the flowers are either white or yellow, but a few have red or purple blossoms. The calyx has from five to seven lobes and as many bracts; the petals correspond in number to the calyx lobes. Stamens numerous; carpels many, developing into achenes, on a dry receptacle. The species are distributed throughout the north temperate and Arctic regions; two only in the Southern Hemisphere. Eleven species are included in the British Flora.

SCARLET AVENS

(GEUM CHILOENSE)

$^{2}/_{3}$ Nat. size

PL. 86

History.

The *Potentillas* are nearly allied to the *Fragarias*, or Strawberries, and have very similar flowers; they are chiefly distinguished by the character of the receptacle upon which the fruits (*achenes*) are developed. In *Potentilla* this is small and dry, but in *Fragaria* it is large and juicy. Most of the British species are neat and pretty, and in the early days of gardening in this country were probably more cultivated than they are now; but more than two hundred and fifty years ago we began to introduce exotic species. The first of these was *P. grandiflora* from Siberia (1640), and *P. recta* from South Europe in 1648, followed in 1680 by *P. monspeliensis* from France, and *P. opaca* from South Europe. The year 1822 saw the introduction of three good species from Himalaya—*P. atrosanguinea*, *P. nepalensis*, and *P. splendens*. In cultivation many hybrids have been produced, chiefly by crossing *P. atrosanguinea* and *P. nepalensis*, and these are in greater request than the original species.

Principal Species.

POTENTILLA ALBA (white). Stems weak, trailing; the lower leaves of five leaflets, the upper with three. Flowers nearly an inch across, white with an orange ring near the centre; February to August. Native of the European Alps.

P. ATROSANGUINEA (dark-blood.) Silvery Cinquefoil. Stems hairy, branching, about 2 feet high. Leaves trefoils; the leaflets saw-toothed, and covered with silvery down beneath. Flowers 1½ to 2 inches across, of a beautiful dark crimson colour; May to July. Plate 85.

P. COMARUM (arbutus-like). Marsh Cinquefoil. Stems more or less creeping, purple-brown. Leaflets five to seven, pinnately arranged, coarsely saw-toothed, pale beneath; stipules large. Petals dark purple-brown, smaller than the purplish sepals; June and July. Fruits many achenes, disposed on a crimson, dry, spongy cone, like the fruit of *Arbutus*. A native of our bogs and marshes.

P. FRUTICOSA (shrubby). Stem shrubby, with flaking bark, 2 to 4 feet high. Leaflets three or five, lance-shaped, margins turned back, and untoothed; hairy. Flowers few, 1½ inch across, rich yellow, in terminal cymes; June and July. Bracts lance-shaped. Native of Britain.

P. NEPALENSIS (native of Nepal). Very similar to *P. atrosanguinea*, differing chiefly in the character of the radical leaves, which have five leaflets instead of three. Flowers in June and July.

P. PYRENAICA (Pyrenean). Stems 1 to 1½ foot. Radical leaves long-stalked, with oblong leaflets, toothed only towards the tips; stem-leaves short-stalked, three- to five-lobed. Flowers large, deep yellow; petals very round, overlapping; June to August.

P. RUPESTRIS (growing on rocks). Stems 1 to 2 feet, branched.

Radical leaves, with slender footstalks, and five pinnate leaflets. Stem-leaves with three leaflets, few, almost stalkless. Flowers few, 1 inch across, white; May and June. A native of Europe and Wales.

P. RUSSELLIANA (Russell's). A hybrid, probably the offspring of *P. atrosanguinea* × *nepalensis*. Stem 1 foot. Leaves trefoils. Flowers nearly 2 inches across, of a rich blood-red colour; July to September. Many other hybrids and varieties will be found in the lists of good firms.

Culture. The Cinquefoils succeed as a rule in ordinary garden soil, but they prefer one that is sandy in character. The most appropriate situation for most of the species is the rock-garden or a stony bank. *P. comarum*, however, is used to a marsh habitat, and it would be well to give it a damp position and mix peat or cocoanut-fibre with the soil about its roots. They come readily from seeds or by dividing the roots; in the case of hybrids, of course, the latter method of propagation must be relied upon.

Description of Plate 85. The upper portion of a stem of *Potentilla atrosanguinea*, with a couple of radical leaves. It will be seen that the name Cinquefoil is a misnomer in this case, but popularly the large stipules also count as leaflets, and so help to constitute the five-fold leaf.

AVENS

Natural Order ROSACEÆ. Genus *Geum*

GEUM (the old Latin name, said to be derived from the Greek *geuo*, to give to taste, the roots of *Geum urbanum* being aromatic). A genus of about thirty erect-growing, hardy, perennial herbs. They have large dissected radical leaves, of which the terminal leaflet is always much larger than the others. The stipules grow to the leaf-stalk. The honeyed grow solitarily or in corymbs, and are white, yellow, or red in colour. Like *Potentilla*, the calyx has, in addition to its five lobes, as many little bracts immediately below it. Petals five; stamens many, crowded; carpels numerous with thread-like styles. When these carpels have developed into a round head of achenes, the styles in some species have become hooked hairs, which catch in the fur of animals, and so secure distribution. The species are found throughout the temperate and cold regions of the earth.

History. Two species of *Geum* are indigenous in Britain: *G. urbanum*, common in every wood and hedgerow, and *G. rivale*, less plentiful by the sides of streams. The former has small

CREEPING SAILOR

(SAXIFRAGA SARMENTOSA)

Nat. size

PL. 87

yellow flowers, and is apt to become a troublesome weed when introduced to the garden; but *G. rivale* was probably transplanted from its native streams at an early date. Of the exotic species, the white-flowered *G. album*, introduced from North America in 1730, was probably the first to be cultivated here. *G. strictum*, from the same quarter of the globe, was introduced in 1778, *G. pyrenaicum* from the Pyrenees, 1804. *G. chiloense*, the species most frequently cultivated, came from Chile in 1824. Several others are of more recent introduction, such as *G. rhaticum*, thought to be a natural hybrid between *G. montanum* and *G. reptans*, discovered in the Engadine in 1886.

Principal Species.

GEUM CHILOENSE (Chilian). Scarlet Avens. Stems glandular, about 2 feet high. Radical leaves interruptedly pinnate, leaflets lobed and boldly toothed. Stem-leaves three-parted, deeply cut. Flowers scarlet and copper-coloured, 1½ inch across, in leafy terminal panicles; May to August. Plate 86. This is often known in gardens by the incorrect name of *G. coccineum*, which belongs to a distinct species. There is a very handsome var. *flore pleno*, with dazzling scarlet double flowers.

G. COCCINEUM (scarlet). Stem solitary, erect, about a foot high. Radical leaves tufted, spreading with five or seven leaflets; stem-leaves simple, three-lobed, toothed. Flowers erect, on terminal foot-stalks; petals clawed, purplish.

G. ELATUM (tall). Stem slender, forked, 3 to 4 feet. Radical leaves somewhat similar to those of *G. coccineum*; stem-leaves small, with larger stipules. Flowers on long, slender, erect stalks; petals notched, golden yellow; July. Introduced from Himalaya (1880).

G. MONTANUM (mountain) is a spring flowering dwarf species (6 to 12 inches high). Leaves covered with soft hairs. Flowers yellow, erect.

G. PYRENAICUM (Pyrenean). Stems erect, unbranched, 1½ foot high. Leaves of similar character to those of *G. chiloense*, but lower leaflets smaller. Flowers yellow, nodding, one to four in a cluster; June. Whole plant hairy.

G. RIVALE (near the river). Stems erect, unbranched, 1 to 3 feet, downy. Leaves similar to those of *G. chiloense*, but very variable; stipules small. Flowers drooping, an inch to an inch and a half in diameter; calyx red-brown, downy; petals yellow; May to July.

Culture.

Geums are propagated by seed sown in spring out of doors, or by divisions of the tufts at the same season. Their culture is simple, for they succeed in any well-drained soil. They are well suited for the rock-garden, but *G. rivale*, which is a moisture-loving species, should have a place at the foot of the rockery. *G. elatum*, being tall, will do better in the border.

Description of Plate 86. *Geum chiloense*, the Scarlet Avens, is here represented, with flowers about one-third less than the natural size. The section through flower (Fig. 1) shows the arrangement of the carpels around the conical receptacle, surrounded by the crowd of stamens. Fig. 2 shows a solitary carpel with its long erect style.

SAXIFRAGES

Natural Order SAXIFRAGEÆ. Genus *Saxifraga*

SAXIFRAGA (Latin, *saxi*, rocks, and *frēgi*, to break: many species growing among rocks). A genus of great importance to the gardener, nearly every one of the one hundred and sixty species being beautiful and suitable for cultivation. Mostly perennial, a few annual, herbs. Leaves variable, the radical ones frequently forming a rosette from which the flowering stems arise; stem-leaves usually alternate. The base of the leaf-stalk becomes a sheath, partially enclosing the next newer one. The flowers are white or yellow, rarely red or purple; honey producing, and the stamens ripening before the pistils. The calyx is tubular, with five lobes. Petals five; stamens ten, occasionally five; ovary two-celled, two-lobed, two-styled. Fruit a two-beaked, two-valved capsule, with many small rough seeds. The species are distributed throughout the north temperate and Arctic zones, and in the Andes. Twelve of the species are British.

History. As the British species include *Saxifraga umbrosa*, the London Pride, which is found wild in the West and South-West of Ireland, it is but reasonable to suppose that this was grown in our gardens long before any of the exotics were introduced. We believe this must have been the case, yet we know that it was introduced (or re-introduced) to fashionable gardens at the beginning of last century, when it got its name of London, or London's, Pride, owing to the fact that it was brought out by Messrs. London & Wise, the royal florists. Prior to that time the name London Pride had belonged to the old-fashioned Sweet William (*Dianthus barbatus*). The earliest foreign species of which we have record were *S. cotyledon* and *S. rotundifolia*, which reached us prior to 1596, the former from the European Alps, and the latter from Austria. The others are of comparatively recent importation: *S. Aizoon*, from the Alps in 1731; *S. cæsia*, from Switzerland in 1752; *S. crassifolia*, from Siberia in 1765; *S. cuneifolia*, from Switzerland in 1768; and *S. sarmentosa*, the well-known Creeping Sailor or Wandering Jew of cottage windows, from China in 1771. Our own century has added many species

(*A*) LONDON PRIDE (SAXIFRAGA UMBROSA)

(*B*) SAXIFRAGA HUETII

Nat. size

PL. 88

to our gardens, such as *S. ligulata*, Nepal, 1821; *S. burseriana*, Alps, 1826; *S. mawcana*, Tetuan, 1827; *S. Fortunei*, Japan, 1863; *S. longifolia*, Pyrenees, 1871; *S. valdensis*, Alps, 1871; *S. peltata*, California, 1873: *S. Camposii*, Spain, 1882; *S. diversifolia*, India, 1882; *S. sancta*, Mount Athos, 1882; *S. cortusæfolia*, Japan, 1883, and *S. Huguenini*, Swiss Alps, 1886.

Selected Species.

From a genus so large, and of species so generally desirable, it is not easy to make a small selection. We have included the best-known forms in the following list, but it must not be supposed that non-inclusion implies unsuitability for the gardener's purposes.

SAXIFRAGA AIZOIDES (Aizoon-like). Stems tufted, first erect, then falling prostrate; branched and leafy, often forming large green cushion-like masses. Leaves very narrow oblong; lower leaves crowded, those on flowering stems scattered and more slender. Flowers, half an inch across, golden yellow with red dots: June and July. Native.

S. AIZOON (always living). Stems 5 to 10 inches, erect. Radical leaves clustered, thick, spoon-shaped, the toothed margins white and cartilaginous. Flowers creamy, spotted at base, on a many-flowered scape that is covered with sticky down; June. There are many natural varieties of this species.

S. BURSERIANA (Burser's). Densely tufted, very dwarf. Leaves forming a rosette, three-edged, sharply pointed, glaucous. Flowers solitary, large, milk-white with yellowish nerves; edges of petals curled back; March to June.

S. CÆSIA (grey). Stems 1½ to 3 inches high. Radical leaves very slender, keeled below, margined with dots above; forming rosettes. Stem-leaves few. Flowers white, in small panicles; petals clawed; May and June.

S. CÆSPITOSA (tufted). Flowering stems 3 inches high; flowerless ones 1 inch, densely tufted. Leaves wedge-shaped, three- to five-lobed. Flowers bell-shaped, white; July and August. A native plant, in all probability a merely extreme member of the long series of natural varieties of *S. hypnoides*.

S. CAMPOSII (Don P. del Campos'). Stems 3 to 6 inches. Leaves variable, more or less fan-shaped, three- to five-lobed, lobes with three or more teeth. Flowers white, two-thirds of an inch in diameter; petals spoon-shaped; May. Better known in gardens as *S. Wallacei*.

S. CORTUSÆFOLIA (Cortusa-like leaved). Stemless. Leaves all radical, 2 to 3 inches in diameter, round with lobed base on stout foot-stalks, with slight indications of lobing. Flowers white, in a loose panicle supported on a stout scape; October.

S. COTYLEDON (cotyledon-like). Plant tufted, flowering stem branched pyramidically, 1 to 2 feet high. Leaves flat, spoon-shaped, with a silvery, cartilaginous, toothed edge. Flowers large, white; calyx glandular; May to July. Forms of this species are known in gardens under the names of *S. pyramidalis* and *S. nepalensis.*

S. CRASSIFOLIA (thick-leaved). Rootstock thick and woody. Leaves radical, oval, smooth, toothed. Flowers red, in dense panicles on a stout scape; March to May. Plate 89.

S. DIVERSIFOLIA (vari-leaved). Stem erect, branched, ½ to 1½ foot high. Radical leaves, long-stalked, oval or heart-shaped; stem-leaves small, stalkless, half-clasping the stem. Flowers yellow, with indistinct spots; disposed in corymbs; July.

S. FORTUNEI (Fortune's). Similar in habit to *S. cortusæfolia.* Leaves kidney-shaped, lobed and deeply toothed. Flowers white, in a many-flowered panicle; petals unequal, one being longer and toothed. Half-hardy.

S. GRANULATA (granulate roots). Stem erect, 6 to 18 inches, with brown bulbs at its base as big as a pea. Radical leaves kidney-shaped, lobed and stalked; stem-leaves stalkless, the lobes more sharply cut. Flowers bell-shaped, white, an inch across, drooping; April and May. Native of Britain.

S. HIRCULUS (little goat). Marsh Saxifrage. Stem erect, 4 to 8 inches, leafy, branched from the base, from which also runners are produced. Radical leaves, stalked, lance-shaped or spoon-shaped, forming a rosette; stem-leaves very slender, faintly toothed. Flowers almost solitary, petals yellow with red dots at the base, where are two tubercles; August. Native of Britain, but rare. There is a var. *grandiflora* with larger flowers, 1 inch across.

S. HUETII (Huet's). Stems reclining, 3 inches high. Leaves kidney-shaped or spoon-shaped, fleshy. Flowers small, numerous; May to August. Annual. Native of Asia Minor. Plate 88.

S. HYPNOIDES (Hypnum-moss-like). Eve's-Cushion; Mossy Saxifrage. Barren shoots long, reclining. Flowering shoots 3 to 8 inches long. Radical leaves three- to five-lobed. Stem-leaves variable, from very slender to broad, more or less lobed. Flowers bell-shaped, white, 1 inch across; May to July. A native species much cut up by various authors.

S. LIGULATA (strap-shaped). Stems 1 foot. Leaves egg-shaped, toothed, fringed with fine hairs. Flowers white, suffused with red, borne in a forking panicle; March to May.

S. LONGIFOLIA (long-leaved). Stemless. Leaves radical, forming a dense rosette; very narrow, leathery, 6 inches long, with cartilaginous,

THICK-LEAVED SAXIFRAGE

(SAXIFRAGA CRASSIFOLIA)

$^1/_2$ Nat. size

PL. 89

toothed margins. Flowers white, dotted with red, disposed in a dense pyramidal panicle, a foot high; July.

S. MAWEANA (Maw's). Lower leaves roundish, kidney-shaped, on flattened stalks, forming a loose rosette; upper leaves wedge-shaped, three-lobed. Flowers white, ¾-inch in diameter, on erect stalks 4 to 6 inches long; May and June.

S. OPPOSITIFOLIA (opposite-leaved). Stems tufted, creeping, 6 to 18 inches long. Leaves small, opposite, thickened towards the blunt tip, and fringed with bristles; overlapping like the tiles on a roof, in four series. Flowers bell-shaped, bright purple, solitary, ½-inch across; April and May. A native of Britain, affecting Alpine rocks. There are several varieties: *alba*, with white flowers; *major*, with larger flowers; *pyrenaica superba*, more erect, flowers twice the size of the type, rosy lilac; *splendens*, with rosy crimson flowers.

S. PELTATA (peltate-leaved). Umbrella Plant. Stems 2 feet. Leaves round, 6 to 12 inches in diameter, six- to ten-lobed, the lobes toothed; leaf-stalks attached to centre of underside (*peltate*), which is pale coloured. Flowers white or rosy, ½-inch across, in large cymes; April.

S. PURPURASCENS (purplish). Stemless, 3 to 6 inches high. Leaves large, oval with somewhat wavy margins, polished, sometimes with impressed dots. Flowers purple, nearly an inch across, nodding, in few-flowered corymbose panicles; June.

S. RETUSA (tip of leaf indented). Stems few-leaved, erect, 1½ inch. Plant similar to *S. oppositifolia*, but with pink flowers; May and June. Leaves three-angled, with perforated dots.

S. SANCTA (holy). Stems smooth and leafy, densely tufted and rigid. Leaves lance-shaped, toothed and keeled, overlapping. Flowers yellow, in short dense spike; May to August.

S. SARMENTOSA (twiggy). Creeping Sailor; Strawberry Begonia; Mother of Thousands; Wandering Jew, etc. Leaves almost round, with large blunt teeth, dark green with paler veins, underside red; on long stalks. Flowers in a long loose panicle 9 to 12 inches high; petals very unequal, two being long and white, whilst three are much shorter, spotted with scarlet and yellow; June and July. A number of thread-like runners are produced from the rootstock. Half-hardy. Plate 87. The var. *tricolor* has the foliage blotched with white and red.

S. UMBROSA (shady). London Pride; St. Patrick's Cabbage; None so Pretty; Painter's Despair, etc. Leaves broadly oval, leathery, narrowed into the stout leaf-stalk, round-toothed, forming rosettes. Flowers white, often spotted with red, ¼-inch across, in panicled cymes; sepals reddish, anthers red; June and July. A native of Ireland. Plate 88.

Cultivation. Most of the species being perennial and tufted, are most readily propagated by divisions. The rootstock of *S. umbrosa* sends out so many branches that it forms dense masses from which tufts may be cut, and these root readily without flagging. The smaller mossy kinds are as readily increased, but in their case the divided portions should be kept moist and in the shade until firmly rooted. Those with runners, like *S. sarmentosa*, should be pegged down in pots and rooted before separating from the parent. As a rule, the Saxifrages thrive best on rock-gardens, but a few (indicated in above list) are natives of marshy ground, and for these provision should be made by a liberal admixture of peaty soil in their compost. A very beautiful effect may be obtained by forming a special Saxifrage garden on the rockery principle, with *S. umbrosa* and *S. cotyledon* occupying the heights, where their abundant and graceful panicles show to perfection. The mossy section would grow between and over the stones at various heights, according to size and robustness, whilst moisture-loving kinds could be accommodated at the foot. The half-hardy kinds should be kept moderately dry during the winter, and care must be taken to prevent moisture gathering in the dense foliage at this period. They are all among the most easily cultivated of plants. The annual species sow themselves.

Description of Plates 87 to 89. Plate 87 represents *Saxifraga sarmentosa*, or Creeping Sailor, of the natural size, with a runner (*stolon*) and young plant. Fig. 1 is an enlarged flower in section, showing the dissimilarity in size and colour of the petals.

Plate 88 includes two species: A is *S. umbrosa*, or London Pride, natural size. Fig. 1 is an enlarged view of a flower, and Fig. 2 is a section through the carpels of the same. B is *S. Huetii*, a portion being enlarged in Fig. 3; the seed, natural size and enlarged, at Fig. 4; and a seedling, Fig. 5.

Plate 89 gives a half-sized portrait of *S. crassifolia*, the thick-leaved Saxifrage, with its thick rootstock and its dense panicle of rosy flowers, one of which is shown in section at Fig. 1; 2 represents the detached carpels.

HYDRANGEAS

Natural Order SAXIFRAGEÆ. Genus *Hydrangea*

HYDRANGEA (Greek, *hydor*, water, and *aggeion*, a vase or vessel; from the shape of the fruit). A genus of about thirty shrubs or trees, with opposite, stalked leaves and showy flowers in large terminal corymbs or

HYDRANGEA HORTENSIA

Nat. size

panicles. The fertile flowers are small, but others develop their sepals enormously, at the expense of the sexual organs, and consequently are barren. In a normal flower the petals are four or five; calyx five-toothed; stamens eight or ten; styles four or five. The species are chiefly Asiatic, but a few come from North America; the latter are more hardy, but less ornamental than those from Asia.

History. The *Hydrangeas* as garden plants are comparatively modern, *H. arborescens*, the species with which we have been longest acquainted, having been introduced from Virginia in 1736, and *H. radiata* from the same locality fifty years later. Both these species have greenish white flowers; but in 1790, Sir Joseph Banks made us acquainted with a pink-flowered species by his introduction of *H. Hortensia* from China. This, in one or other of its varietal forms, has been popular in cultivation ever since. In more recent years new varieties of this species have been imported from Japan, in addition to those raised by selection in our own gardens, and new species have been discovered. Among these are *H. paniculata* (1874), *H. Thunbergii* (1874), *H. petiolaris* (1876), and *H. scandens* (1879)—all from Japan. The likeness subsisting between these showy balls of sterile blooms and those of *Viburnum*, or Guelder Rose, is very striking; and one is not greatly surprised to learn that the same causes produce similar results in Orders as widely separated as are SAXIFRAGEÆ and CAPRIFOLIACEÆ.

Principal Species. HYDRANGEA ARBORESCENS (tree-like). Stems 4 to 6 feet. Leaves oval, inclined to heart-shaped, the upper ones lance-shaped, coarsely toothed, pale and covered with minute down beneath. Flowers greenish white, in rather flat corymbs, and with an agreeable scent; July and August.

H. HORTENSIA (a former name of the genus). Common Hydrangea or Hortensia. Stems 2 to 5 feet high. Leaves broadly oval, saw-toothed. Flowers large, pink, white or blue, according to the nature of the soil, variable in size and number of parts, but disposed in large globular corymbs; fertile individuals few; April to September. Plate 90. There are several varieties of this species, among them var. *Lindleyi* (including the garden vars. *roseo-alba* and *cærulescens*), with the outer flowers only radiate, white, rosy or blue; var. *otaksa*, with nearly all the flowers sterile; var. *stellata*, flowers yellowish green, turning to rose-colour, all sterile; var. *variegata*, leaves variegated red or yellow.

H. PANICULATA (panicled). Somewhat similar, but leaves often in threes, downy; flowers small, white, in a dense panicle a foot long; June to September. When well-grown all the flowers are sterile and pure white, in an enormous panicle.

H. PETIOLARIS (stalked). Stem slender, branching, rooting into its support, like ivy. Flowers white in broad flattened cymes, 6 to 8 inches across; April and May. Requires the protection of a cool greenhouse.

H. QUERCIFOLIA (oak-leaved). Stems 4 to 6 feet. Leaves large, oval, lobed and toothed in a similar manner to those of the Oak. Flowers greenish white, or pink, in large flattened corymbs; June to August.

H. THUNBERGII (Thunberg's). Stems 2 to 3 feet high. Leaves smaller. Flowers blue or rosy, in terminal cymes; June; half-hardy.

Culture. Hydrangeas are readily propagated in summer by means of cuttings, or by taking off the suckers that grow up from the base of the stems. The plants require a sheltered position out of doors, and a rich, moist soil. Should the soil be light and poor, considerable improvement may be effected by mixing in decayed cow-manure. *H. paniculata* forms a shrub 3 feet high and produces in summer enormous panicles of white flowers; the old stems require to be cut down to the ground every year as soon as the flowers are over. In the South of England near the sea they are common garden bushes, so well do they thrive. To our mind, such bushes, four or five feet high covered with enormous corymbs of flowers, are better worth looking at or having than the more fashionable but stiff pot specimens, with a single stem upon which grows a big head of flowers, out of proportion to the size of its support. For this method of culture in pots, cuttings are placed singly in pots and brought on in a frame, which is kept close and warm, and there left through the summer. In early autumn they must be gradually hardened, and finally placed outside with full exposure to the sun. With this treatment the wood will ripen and the leaves fade. This is the signal for withholding the water that has hitherto been given in abundance; and as the pots dry they should be removed to a cool house and wintered dry. Between the middle of January and the middle of February they should be turned out and repotted in five- or six-inch pots, using a mixture of equal parts loam and cow-manure. Increase the temperature and give water, and growth will at once commence. If the cuttings were taken from the tops of robust shoots they will soon show the flower-buds under this treatment; and as these begin to increase in size, artificial manure should also be given until the big corymb is well expanded. For bush plants in the garden the treatment is much simpler. Old plants that have flowered may be cut down, but a number of young shoots will break from the base. When partially ripened these may be removed, and they will readily root; they may then be planted straight into the border, and if well-watered and manured will soon form large flowering clumps. As a rule, where the soil is well-drained they survive

DEUTZIA GRACILIS

¾ Nat. size

PL. 91

the winter outdoors without protection, but in very cold or exposed situations they should be covered with dry fern or similar protective material.

Description of Plate 90. *Hydrangea Hortensia*, the Common Hydrangea, is here shown a little less than the natural size. The upper corymb consists entirely of sterile flowers, but below it is a similar cluster of fertile flowers with four barren flowers at its circumference. Fig. 1 shows a fertile flower enlarged, and Fig. 2 an enlarged section through the carpels of the same.

DEUTZIAS

Natural Order SAXIFRAGEÆ. Genus *Deutzia*

DEUTZIA (name given by Thunberg in honour of his friend Johann Deutz). A small genus, comprising only about seven species, of deciduous shrubs of a very ornamental character. They have opposite, stalked and toothed leaves, oval or lance-shaped, and covered with star-shaped hairs. The flowers are white or pinkish, scentless. Petals five; stamens ten, five long and five short; the filaments often dilated, and three-lobed near the extremity, the middle lobe bearing the anther. Ovary three- or four-celled, with as many erect thread-shaped styles. Capsule globular, leathery, opening by several slits in the middle. Natives of India, China, and Japan. They are spring-flowering shrubs, but by forcing, flowers are obtained from January onwards.

Species. DEUTZIA CORYMBOSA (flowers in corymbs). Stems 5 feet high. Leaves oblong or lance-shaped. Flowers white, corymbs panicled. Native of Himalaya.

D. CRENATA (round-toothed leaves). Stems slender, 4 to 8 feet. Leaves broad, lance-shaped, with rigid teeth; rough to the touch. Flowers white, in panicles or racemes. The ordinary form is better known in gardens as *D. scabra*, but there is a true *D. scabra* (not cultivated); it is also known as *D. Fortunei*, but these are mere garden names. There are two double varieties: *flore pleno*, with pink and white flowers; and *purpurea plena*, with flowers of a deeper tint. Native of Japan.

D. GRACILIS (slender). Stems numerous, slender, 3 to 5 feet high. Leaves small, oval, smooth, saw-toothed. Flowers small, white, numerous, in terminal racemes; March to May. Native of Japan. Plate 91.

D. STAMINEA (prominent stamens). Stems 3 feet high. Leaves broad, lance-shaped, woolly beneath. Flowers white, fragrant; corymbs many-flowered; May and June. Native of Himalaya.

Cultivation. Deutzias are hardy shrubs in the South of England, and may be grown in the border, but a wintry spring is likely to spoil that season's floral display so far as these plants are concerned. It has, therefore, been customary to grow them more as pot-plants, and as subjects for forcing in order that their flowers may be available in the first days of the year. They are not particular as to soil or position, but a rich loam is the most suitable. For potting this should be improved by the incorporation of well-rotted cow-manure and sharp sand. Cuttings should be taken from the lateral shoots, and slipped off with a heel. These may be rooted in a shady border or in a cold frame. In autumn they should be potted if required for indoor use, or planted out in the shrubbery border. Those in pots should be placed in cold frames, where they will gradually develop during the winter, and from which they may be taken in succession and brought into a higher temperature gradually. They do well between 45° and 50°, producing leaves as well as flowers, whereas at a higher temperature the flowers precede the leaves. For forcing *D. gracilis* stands unrivalled, but the same plant should not be forced two seasons in succession.

Description of Plate 91. A flowering shoot of *Deutzia gracilis*, reduced about one-third from the natural size. The extra figures are—1, an enlargement of the flower; 2, a section of the same; 3, a stamen; 4, the calyx and female organs, after removal of the petals and stamens.

JAPANESE SPIREA

Natural Order SAXIFRAGEÆ Genus *Astilbe*

ASTILBE (Greek, *a*, without, and *stilbe*, lustre or brightness, from the smallness of the flowers). A small genus of branching herbs, with slender stems and compound leaves. The flowers are similar to those of the genus *Saxifraga*. Stamens eight or ten; carpels three. They are natives of Asia and North-East America. As garden plants they are distinctly modern, all having been introduced during the present century. *Astilbe japonica* may be said to have a history, which consists, however, of a record of its being bandied about from one genus to another. Formerly regarded as a species of *Spiræa*, it was not only

JAPANESE SPIREA

(ASTILBE JAPONICA)

$^{2}/_{3}$ Nat. size

PL. 92

called *S. japonica* but *S. barbata* also. It has also been described under the name of *Hoteia japonica*, and may be found in gardens and in florists' catalogues under either name, but its correct designation is *Astilbe japonica*.

Principal Species.

ASTILBE JAPONICA (Japanese). Stems 1 to 2 feet high. Leaves compound, of nine to twelve lance-shaped or narrow-oval leaflets with toothed edges; the leafstalks hairy at the joints. The flowers are small, white, associated in dense racemed panicles; May and June. Native of Japan. Plate 92. There are several varieties in cultivation. One of these, var. *foliis purpurea*, has purplish stems and leaves; another, var. *variegata*, has the leaves prettily marked with yellow, and denser panicles.

A. RIVULARIS (growing by rivulets). Stems 3 feet high. Leaflets six or nine, oval, double-toothed, hairy. Flowers creamy to reddish; July and August. Native of Nepal.

A. RUBRA (red). Stems 4 to 6 feet high. Leaflets six, oblique, heart-shaped, toothed. Flowers rosy, in dense panicles; July to September. Native of India.

A. THUNBERGII (Thunberg's). Stems sub-shrubby, somewhat downy, 20 inches high. Leaves unequally pinnate; leaflets oval, toothed, of a yellowish hue. Flowers white, small, in erect pyramidal panicles; May. Introduced from Japan within the last twenty years.

Cultivation.

The species mentioned are most suitable for damp places, although they will grow anywhere if freely watered and well-manured. Without these conditions, they may leaf freely, but their panicles of flowers will be thin and insignificant, and the foliage liable to turn brown at the edges. *A. rubra* should be turned out of doors only in summer. They are all well-suited for pot-culture, and *A. japonica* and *A. Thunbergii* are much used for forcing. Propagation is effected in spring by division of the clumps, the portions being planted out in partial shade, in heavily-manured soil. In autumn, if required for decorative purposes, these should be taken up and potted in equally rich soil, the pots being then plunged into ashes or cocoa-nut fibre. When the new roots have had time to fill the pots, the plants may be successively brought into heat and forced into blossom early in the new year. From the time growth commences, water must be given in abundance, and to ensure a sufficiency the pots should stand in deep saucers of water. Large numbers are imported from the Continent every year for greenhouse or table decoration, and very commonly after they have served this purpose they are allowed to dry

up and die quickly, though with very little attention they might be preserved for garden use.

Description of Plate 92. Upper portions of both leafy and flowering shoots of *Astilbe japonica*. Fig. 1 is a separate flower greatly enlarged to exhibit the parts.

GRASS OF PARNASSUS

Natural Order SAXIFRAGEÆ. Genus *Parnassia*

PARNASSIA (from Mount Parnassus, Dioscorides having named the common species Grass of Parnassus). A genus of about a dozen slender, erect perennial herbs, with entire, chiefly radical, leaves and solitary flowers, large in proportion to the plant. The floral parts are in fives, the petals thick and enduring. They are distributed throughout the Arctic and Temperate regions of the globe.

PARNASSIA PALUSTRIS (marsh-loving) is a native of our own bogs and wet moors. It attains a height of about 6 inches only. The leaves are heart-shaped, mostly radical, and these have long footstalks. The stem-leaves are stalkless, and only one to each stem, about half-way between rootstock and flower. The flowers are about an inch across, the leathery petals white, strongly veined with green; August and September.

Grass of Parnassus should be provided for in the garden by utilising a damp-hollow, digging out the ordinary soil and filling in with peat. Here may be grown a number of bog-loving plants of considerable beauty, such as the Bog-bean (*Menyanthes*), Sundews (*Drosera*), Bog-Asphodel (*Narthecium*), and others. *Parnassia* may be propagated by seeds or by division of the rootstock.

SYRINGA OR MOCK ORANGE

Natural Order SAXIFRAGEÆ. Genus *Philadelphus*

PHILADELPHUS (Greek, brotherly love). A genus of about a dozen species of hardy shrubs, with opposite leaves and white or straw-coloured flowers. The flowers ordinarily consist of a four-lobed calyx, four petals, and from twenty to forty stamens. They are natives of North America, Japan and Himalaya. Although popularly known as Syringas, these

SCARLET CRASSULA

(ROCHEA COCCINEA)

$^{3}/_{4}$ Nat. size

PL 93

plants have no right to this title, which is the botanical name for the Lilacs. All the species are worth growing, but the best-known and most widely cultivated is—

PHILADELPHUS CORONARIUS (garland), the Common Syringa, or Mock Orange. A bush with straight stems, 4 to 10 feet high. Leaves oval, saw-toothed, with the flavour of cucumbers both to the taste and smell. Flowers white, fragrant, in racemes, of which the terminal flower is five-parted: May. A native of Asia, but cultivated in this country for three hundred years. There are a number of varieties, some of which may be briefly mentioned. Vars. *flore pleno* and *primuliflorus* have double flowers; var. *foliis-argenteo-variegatis* has the leaves edged with white; var. *foliis-aureis* has golden-yellow leaves; var. *nanus* is a dwarf form.

P. GRANDIFLORUS (large-flowered). Stems slender, 6 to 10 feet high. Leaves nearly round, with irregular teeth: downy when young. Flowers large, white, fragrant; June. Introduced from United States (1811).

P. MICROPHYLLUS (small-leaved). Stems and branches slender, erect. Leaves small, lance-shaped or oblong, not toothed. Flowers white, at end of shoots, solitary or in groups of three. Native of New Mexico (1883).

Cultivation. These plants thrive in ordinary garden soil. Some of them soon grow into large shrubs unless well cut back each year. After the flowers have faded the flowering-stems should be cut away; this will allow the new growths to ripen better, thus assuring a finer display of bloom next year, and will prevent the bush getting too large and unsightly. Propagation may be accomplished in spring by separating the suckers that shoot up around the base; or by taking cuttings from young shoots and striking them in a frame or under a handlight, keeping them moist. *P. Lemoini* is suitable for forming large beds on the lawn.

ESCALLONIAS

Natural Order SAXIFRAGEÆ. Genus *Escallonia*

ESCALLONIA (named by Linneus the younger in honour of Escallon, a Spanish traveller, who discovered *E. floribunda*, the first known species). A genus of hardy or half-hardy evergreen shrubs, comprising about thirty-five species, all natives of South America. The leaves are tough, scattered; flowers red or white, in terminal racemes or panicles. Calyx spreading with five teeth; petals five, with long, broad, erect claws and

spreading limbs. Stamens five style one; stigma two-lobed. In the South of England they are quite hardy, and in the South-West they grow very rapidly and flower freely. They are frequently planted to form hedges, for which purpose they are well suited. The species most commonly cultivated is—

ESCALLONIA MACRANTHA (large-flowered). Stems, 10 feet high, rough with glands. Leaves elliptic, blunt-toothed, dark and shining above, pale and dull below, closely dotted with glands. Flowers large crimson red in terminal racemes, honeyed; June to September. Introduced from Chiloe (1848). A common plant in gardens on the South-West coast, Ireland, etc.

Cultivation. Given a well-drained situation with favourable temperature, and the character of the soil appears to be of no moment to these shrubs; they appear to do best near the sea. They are easily propagated by suckers from the base, by layering, or by cuttings from the half-ripe wood in autumn.

FLOWERING CURRANTS

Natural Order SAXIFRAGEÆ. Genus *Ribes*

RIBES (from *Ribas*, an Arabic name for some medicinal plant). A genus including between fifty and sixty species of hardy shrubs, with scattered, stalked leaves, and white, yellow, red, or green flowers, in racemes or solitary. Calyx tubular or bell-shaped, four- or five-toothed, often coloured; petals minute, scale-like, in the throat of the calyx. Stamens four or five; styles two. Fruit a globose berry. Natives of the Northern Temperate regions and the Andes; four species British. Several species are well known in gardens on account of the juicy fruit they produce, viz. *R. grossularia*, the gooseberry; *R. rubrum*, the red currant; and *R. nigrum*, the black currant; but with those we have no concern here, for their flowers are insignificant. The only species we shall describe are grown on account of their ornamental flowers, though the fruit of the first is very desirable.

RIBES AUREUM (golden). Buffalo Currant. A smooth, unarmed shrub, about 6 or 8 feet high. Leaves three-lobed, deeply toothed. Flowers golden yellow, in many-flowered racemes; April and May. Fruit smooth, yellow. There are several varieties cultivated. Introduced from Western North America (1812).

R. SANGUINEUM (blood-red flowers). Flowering Currant. An un-

CRASSULA FALCATA

$^{2}/_{3}$ Nat. size

PL. 94

armed shrub, 4 to 8 feet high. Leaves heart-shaped, five-lobed, toothed, somewhat smooth above, woolly beneath. Flowers deep rosy, in long downy racemes, appearing before the leaves in early spring. Introduced from California (1826.)

R. SPECIOSUM (showy). Fuchsia-flowered Gooseberry. Stems 6 to 8 feet high (less in a wild state), the branches bristly, spines in threes below the axils. Leaves somewhat three-lobed with wedge-shaped base, smooth. Flowers deep red, with stamens twice their length, produced in threes; May. Introduced from California (1829).

Cultivation. Nothing could be simpler than the cultivation of these plants. Almost any piece broken off and stuck in the soil will root. Properly-made cuttings are as easy to strike, and the pliant stems if layered root readily. Soil is of little moment. *R. speciosum* is a beautiful wall plant.

CRASSULAS

Natural Order CRASSULACEÆ. Genus *Rochea*

ROCHEA (name commemorative of M. de la Roche, a French botanist). A genus comprising about four species of fleshy shrubs, with opposite fleshy leaves, connate at the base, quite entire. The flowers are borne in terminal umbellate cymes; white, pink, or scarlet in colour. The calyx is five-lobed, the corolla tubular, salver-shaped, five-parted. Stamens five; carpels five. The species are restricted to the Cape of Good Hope.

History. *Rochea coccinea*, the only well-known species, was first brought to England in the year 1710 from Table Mountain, South Africa; *R. odoratissima* came from the same neighbourhood in 1793, *R. jasminea* in 1815, and *R. versicolor* a couple of years later. None of these can be said to be widely grown by amateurs, though the professional growers turn out large quantities of *R. coccinea* and *R. jasminea* in bloom for decorative purposes. The reason for this neglect is to be found in the necessity for a hot-house in order to grow them well—unless one is a cottager, and possesses one of those deep window recesses where so many good things thrive.

Species. ROCHEA COCCINEA (scarlet). Stems 1 to 3 feet high. Leaves ovate-oblong, half-clasping the stem. Flowers scarlet, an inch long: June to August. Plate 93.

R. JASMINEA (Jasmine-like). Stems leaning upon the ground. Leaves lance-shaped, blunt. Flowers in shape much like those of the Jasmine; white at first, afterwards turning reddish; April and May.

A series of hybrids between *Crassula falcata* and *R. jasminea* in

which the characters of the two are happily combined are now well known in gardens. They have pink, red, pale pink, and variegated flowers.

R. ODORATISSIMA (fragrant). Stems erect, 12 to 20 inches high, rough, sometimes branched. Leaves narrow-lance-shaped or awl-shaped. Flowers creamy white, pale yellow, or rosy, an inch long, sweet-scented, in many-flowered cymes; June and July.

R. VERSICOLOR (changeable). Stems erect, branched, 2 feet. Leaves lance-shaped, sheathing, with fringed edges. Flowers red, white within with the exception of a red margin, the colour from which gradually spreads all over the interior; in terminal umbels; fragrant at evening; May to September.

Cultivation. The suggestions to be given under this head apply to the closely-allied genera of *Rochea* and *Crassula*, which are alike in general structure and habitat. They should all be grown in pots, for they need to be wintered in a greenhouse and kept dry. The soil that suits them best is a compost of sandy loam, three parts, to one part each of well-rotted manure, leaf-mould, and small brick rubbish. They are propagated by seeds, but chiefly from cuttings taken in July. These should be laid in the sun for a couple of days at least before potting, in order to allow the cut portion to dry. This accomplished, insert in three-inch pots and place in the greenhouse in a dry and sunny position. Here they should remain until the following spring, when, as soon as growth commences, they should be shifted into larger (five-inch) pots. When again well established, check the growth by nipping out the growing point, and withhold water for a couple of days. This treatment produces a series of lateral shoots which will all bear flowers. By further stopping, these may each be made to send out branches until a bush has been formed sufficiently large to satisfy the grower, but with each stage in this process a shift should be made to a correspondingly larger pot, and the shoots must be tied out to neat little sticks. After flowering each shoot requires to be cut back until not more than two inches long, and when growth has again started cut back the longest roots and re-pot, giving them fresh soil but no larger pots. Water should now be given sparingly, only in sufficient quantity to keep the soil moist until the new roots have got well hold of it. During the growing period they should have sufficient water, but it needs to be given with care, and the drainage must be perfect. During winter it is essential that no more water than suffices to prevent the flesh shrivelling be given to them.

Description of Plate 93. A single-branched stem of *Rochea coccinea* with two flower heads. These are reduced by about one-fourth from the natural size. At Fig. 1 is shown an enlarged section of a flower.

COTYLEDON RETUSA

Nat. size

PL. 95

SICKLE CRASSULA

Natural Order CRASSULACEÆ. Genus *Crassula*

CRASSULA (from Latin, *crassus*, thick, from the leaves). A genus comprising about one hundred and sixteen species of fleshy shrubs and herbs, mostly South African, and requiring greenhouse treatment in this country. The description of *Rochea* applies to *Crassula*, except that in the former genus the petals are united to form a tube, whilst in *Crassula* they are free throughout their length or united only at the base.

History. From the commencement of the eighteenth century, when *Crassulas* began to be introduced from the Cape, we have kept up a very steady importation of new species from the same source every few years, and yet very few of the species are at all widely grown. We might indeed go further and say only one species is fairly well known—*C. falcata*. This is the most striking from the floral standpoint, but several others are worthy of cultivation, if only for their ornamental or grotesque appearance. *C. perfoliata* appears to have been the first introduced (1700), *C. falcata* ninety-five years later, with many others in between and since, one of the latest being *C. alpestris* (1878).

Principal Species. CRASSULA ARBORESCENS (tree-like). Stems round, erect, 2 to 3 feet. The opposite leaves are flat and roundish, ending in a little hard point, glaucous, dotted above. Flowers large, rosy, in panicled cymes; May.

C. FALCATA (sickle-leaved). Stems 3 to 8 feet high. Leaves thick, oblong, blunt-pointed, glaucous, bent somewhat in form of sickle. Flowers bright crimson, occasionally white, in dense terminal corymbs; June to September. **Plate 94.**

Description of Plate 94. The upper portion of a flowering stem of *Crassula falcata*. Fig. 1 is a detached flower enlarged, Fig. 2 a section of the same. For cultural directions, see *Rochea*.

COTYLEDONS

Natural Order CRASSULACEÆ. Genus *Cotyledon*

COTYLEDON (Greek, *kotyle*, a cup or cavity, from the hollowed leaves of some species). A genus of about sixty fleshy herbs or small shrubs. Leaves usually alternate, thick, fleshy. Flowers in terminal spikes or

racemes. Calyx five-parted; corolla-tube cylindric or urn-shaped, rounded or five-angled, lobes five. Stamens ten; carpels five, with thread-like styles. Fruit a many-seeded follicle. The species are distributed throughout the West and South of Europe, the whole of Africa, Mexico, and temperate Asia.

History. The plants now brought together by botanists into the genus *Cotyledon* were formerly separated into the genera *Cotyledon*, *Echeveria*, *Pachyphytum*, *Pistorinia*, and *Umbilicus*. The remembrance of this fact may obviate some confusion. One solitary species is indigenous—*Cotyledon umbilicus*, the Navelwort, confined chiefly to the Western coasts. Among the earliest of the foreign species to be introduced was *C. orbiculata*, two hundred years ago, from the Cape, whence also came *C. hemisphærica* in 1731, and *C. fascicularis* in 1759. Four years before the beginning of this century *C. cæspitosa* was introduced from California; whilst the well-known *C. gibbiflora* (1826), *C. secunda* (1837), and *C. retusa* (1846) all came from Mexico. There are numerous hybrids in cultivation.

Principal Species. COTYLEDON AGAVOIDES (Agave-like). Flowering stem slender, 8 to 12 inches high. Leaves ovate, narrowed to a spiny point, glaucous, forming rosettes. Flowers orange, few. Native of Mexico.

C. ATROPURPUREA (dark purple). Stem stout, short, with leaves forming an Aloe-like rosette at its summit. Leaves egg-shaped, dark purple, with a "bloom" upon them. Flower-stem erect, bearing a long raceme of five-sided bright purplish-red flowers, white towards the base. Introduced from Mexico (1869).

C. FULGENS (shining). Stem 4 to 6 inches high, with leafy flowering branches, 12 to 18 inches long. Leaves egg-shaped, pale glaucous, in a thin rosette. Flowers wax-like, coral red, with yellow base; in panicled racemes. Native of Mexico.

C. GIBBIFLORA (humped flowers). Stems branched, 1 to 2 feet high. Leaves wedge-shaped, ending in a sharp hard point; crowded at tops of branches. Flowers, white at base, scarlet towards the tips of the humped petals; on short footstalks along the spreading branches of the panicle; July. The well-known var. *metallica* has metallic-looking, purple-glaucous, egg-shaped leaves, 6 inches across. The flowers are yellowish, tipped with red, in a long-stemmed, many-flowered panicle. There are many garden varieties.

C. GRANDIFLORA (large-flowered). Stems 1 to 2 feet. Leaves rounded, wedge-shaped; white or glaucous; lower ones forming a

COTYLEDON SECUNDA, *var. glauca*

Nat. size

PL. 96

rosette. Flowers reddish orange, tinged with purple, in panicles; October. Native of Mexico (1828).

C. PEACOCKII (Peacock's). Flower-stem lateral, slender, reddish brown; 1 foot. Leaves spoon-shaped, large, pale glaucous, edged with red, forming a close rosette. Flowers bright red; July. Introduced from Mexico (1874).

C. RETUSA (blunt-leaved). Flowering stem 1½ foot high. Leaves spoon-shaped, glaucous, the largest faintly toothed; stem-leaves narrow, quite entire. Flowers scarlet in panicles; petals keeled, humped at the base. In the greenhouse this flowers freely from November to April. Plate 95.

C. SECUNDA (turned aside—in reference to flower-stem). Flowering stem 1 foot high. Leaves wedge-shaped, with a stiff point at tip, glaucous, forming a rosette. Flowers red externally, yellow within; petals keeled; June to August. There are several varieties, of which *glauca*, figured on Plate 96, is one of the best.

C. UMBILICUS (navel). Wall Pennywort; Pennypies; Navelwort. Leaves roundish, hollowed in centre, stalk attached to centre of underside (*peltate*). Flowers greenish white, drooping, in long erect racemes; May and June. This is a hardy native of neat habit, suitable for growing in the crevices of old walls, where its singular flowers have a pretty effect.

Cultivation. Cotyledons make handsome pot-plants for decorative purposes, and are invaluable where ornamental bedding is carried out. They require winter protection, but in most cases the shelter of a dry frame, covered with mats in severe weather, is sufficient. Some, however, like *C. gibbiflora*, must be kept almost dry in a dry, warm house during the winter. The great danger to be guarded against in plants of this character is damping-off from too much moisture at the roots, or from drip upon the leaves. A well-drained sandy loam is the best for successfully growing Cotyledons. Many of the species and varieties are suitable for window-gardening. Propagation is sometimes effected by seeds (necessarily so in the case of annual species), but usually by cuttings and divisions, or by detaching leaves and striking them. Cuttings should be taken early in summer, and they should be allowed to dry at the severed part before putting them into a close, cool frame until rooted. Early in autumn these cuttings should be potted in sandy loam and placed in the greenhouse. Some of the species produce few or no offshoots, and from these leaves must be carefully *pulled* off without injury in autumn. These are laid on dry sand in pans in a warm house. No water should be given until tiny plants have formed at the edge of

the leaf; then they must be watered, and as soon as sufficiently grown they should be potted.

Description of Plates 95 and 96

Plate 95. *Cotyledon retusa.* Fig. 1, enlarged flower; Fig. 2, section of same.

Plate 96. *C. secunda*, var. *glauca.* Fig. 1, enlarged section of flower; Fig. 2, transverse section of fruit.

STONECROPS

Natural Order CRASSULACEÆ. Genus *Sedum*

SEDUM (Latin, *sedeo*, to sit, from the half-recumbent habit of some of the species). A large genus of succulent herbs, usually with alternate leaves and white, yellow, pink, or blue flowers in cymes. The calyx is four- or five-lobed; petals separate, four or five; stamens four or five; carpels four or five, distinct or joined at the base, styles short. The fruits are follicles. The one hundred and twenty known species are distributed through the Temperate and Arctic regions of the Northern Hemisphere, and a few in America.

History.

No less than eight species of *Sedum* are indigenous to Britain, and having regard to the neat habit of most of these, and the fact that we began introducing exotic species three hundred years ago, it is no wild shot to surmise that from very early times our wild *Sedums* found place in our gardens. On the garden walls, the fanciful grottoes, and the roofs of garden sheds they would have their place, as we may gather from their names of Wall Pepper and Small Houseleeks; besides being used for bordering, for which purpose *S. acre* and similar dwarf forms are so suitable. The first foreign species to be introduced was *S. Anacampseros* from the Continent in 1596, followed by another European species, *S. Cepæa*, in 1640. *S. Aizoon*, an old-fashioned garden plant, came from Siberia in 1757. *S. Ewersii*, one of the best, though rather tender, is also Siberian (introduced 1829); whilst the somewhat similar *S. Sieboldii* came from Japan in 1836.

Principal Species.

SEDUM ACRE (acrid). Wall Pepper, or Biting Stonecrop. Stems 3 to 5 inches. Leaves thick, oval-oblong, blunt, humped at the base; closely laid one on another in six series. Flowers yellow, about half an inch across; June and July. The flowering stems are far less leafy than the barren ones. Native perennial. There are several garden varieties recognised; var. *aureum* has the leaves of a

SEDUM SPECTABILE

Nat. size

PL. 97

golden yellow tint in spring; var. *elegans* has silvery leaves and tips of the shoots; var. *majus*, larger in all respects than the type.

S. AIZOON (Aizoon-like). Stems, several, 1 foot high, erect, unbranched, somewhat angular. Leaves oblong-lance-shaped, coarsely toothed, with prominent midrib. Flowers yellow, $\frac{1}{2}$-inch diam., in loose panicled cymes; July to September. Hardy perennial.

S. ALBUM (white). Stems, barren ones prostrate, flowering ones pinkish, erect, 6 to 10 inches. Leaves narrowly oblong, blunt, narrowed at base, spreading, alternate. Flowers white, nearly $\frac{1}{2}$-inch diam., in corymbose cymes; July and August. Native perennial, rare in the wild state.

S. ANGLICUM (English). Flowering stems, glaucous or reddish, leafy, 1 to 2 inches. Leaves alternate, crowded, ovoid oblong, humped at the base. Flowers white or pink, $\frac{1}{3}$-inch diam., crowded at top of stem; petals lance-shaped, keeled, carpels pink; May to August. Native perennial.

S. CÆRULEUM (bright blue). Stems 2 to 3 inches, branched from the base. Leaves oblong, blunt, tufted; pale green dotted with red. Flowers pale blue, $\frac{1}{4}$-inch in diam., in many-flowered cymes; July. A bright little annual, introduced from the Mediterranean region (1822).

S. EWERSII (Ewers'). Rootstock thick, giving off many trailing and ascending branches. Leaves opposite, almost round, $\frac{1}{2}$-inch across, with heart-shaped, stem-clasping base. Flowers numerous, pink or violet, with darker spots; in dense globose cymes; August and September. Tender perennial.

S. GLAUCUM (glaucous). Barren stems, branched, 2 inches long; flowering stems 3 to 4 inches, reddish. Leaves very slender, greenish grey becoming reddish, $\frac{1}{4}$-inch long; densely crowded. Flowers pinkish, in umbellate cymes, many flowered; July. Hardy perennial; native of Europe.

S. JAPONICUM (Japanese). Stems diffuse. Leaves spreading, slightly reflexed, oblong, pointed, upper side channelled, lower convex. Flowers yellow, in many-flowered, loose panicled cymes; June to August. Native of Japan (1866). Perennial.

S. LYDIUM (Lydian). Barren stems purplish, erect, 2 to 3 inches; flowering stems 4 to 5 inches. Leaves very slender, half-round, eared at base, raised dots at tip. Flowers minute, pinkish, in many-flowered corymbose cymes; July and August. A very neat little perennial introduced from Asia Minor in 1867.

S. MAXIMUM (largest). Stems erect, 1 to 2 feet high, sometimes purple. Leaves opposite, oval, somewhat heart-shaped, clasping the stem. Flowers whitish, spotted with red, in panicled cymes; August and September. Europe. There are a number of varieties of this fine

perennial, some of them being not particularly distinct, but var. *corsicum* has yellow flowers; the vars. *pachyphyllum*, *præruptorum*, *recurvum*, *rigidum*, and *serotinum* have greenish flowers, with small points of difference between themselves. The var. *hæmatodes* has erect, deep purple stems over 2 feet high, and opposite purplish leaves 5 inches long and 3 inches broad, coarsely toothed; whitish red-tipped flowers in panicled cymes.

S. REFLEXUM (turned back). Stone Orpine. Stems trailing. Leaves cylindric with awl-shaped tips, spreading and reflexed, in about six series, crowded. Flowers bright yellow; July and August. Native perennial. There is a smaller variety (*albescens*) with glaucous leaves, and pale yellow flowers; the leaves of the flowering stem differing from the type in not being reflexed. In the var. *cristatum* the stems are flattened out to a great extent, so that at their summit they are several inches broad.

S. ROSEUM (rosy). Rose-root. Rootstock woody, thick and branching, with the fragrance of roses; perennial. Stems annual, fleshy, 6 to 18 inches. Leaves flat, broadly lance-shaped, toothed at the tip, glaucous. Flowers yellow or purplish, $\frac{1}{4}$-inch diam., in compact corymbose cymes; May to August. Native perennial.

S. SARMENTOSUM (twiggy). Stems 4 to 6 inches high, pinkish, branched. Leaves almost cylindric, pointed at tip and slightly humped at base; crowded. Flowers numerous, bright yellow, $\frac{1}{4}$-inch in diam., combined in a flat-topped umbellate cyme. Native of China. Greenhouse perennial. Plate 98B.

S. SIEBOLDII (Siebold's). Stems branched, 9 inches; branches erect, purplish. Leaves nearly round or rounded wedge-shaped, bluish green with pinkish margins; in whorls of three. Flowers pink, in umbellate cymes; August. Plate 98A. There is a variety with yellow variegation. Greenhouse perennial.

S. SPECTABILE (worthy of notice). Stems $1\frac{1}{2}$ to 2 feet high. Leaves oval or spoon-shaped, slightly toothed, opposite or in whorls of three or four. Flowers pink, $\frac{1}{2}$-inch in diam., in umbellate cymes; August to October. Hardy perennial; native of Japan. Plate 97.

S. TELEPHIUM (springing up). Common Orpine, or Live Long. Rootstock short and stout; stems from 6 inches to 2 feet high, sometimes spotted with red. Leaves as much as 3 inches long, oblong or oval, bluntly toothed. Flowers one-third of an inch across, pink, white, or white spotted with pink, in dense corymbose cymes; July and August. Native perennial. There are a number of varieties of this species in cultivation.

Cultivation. The natural habitat of most species of *Sedum* is upon or among rocks, stony banks, old walls, and similar dry

B

A

(*A*) SEDUM SIEBOLDII

(*B*) SEDUM SARMENTOSUM

Nat. size

PL. 98

situations. *S. roseum*, however, selects moist alpine rocks, whilst *S. anglicum* grows upon maritime rocky cliffs, and quite abundantly on isolated rock masses with scarcely any earth. In the garden they will grow almost anywhere, in the driest parts of the rock-garden, in the sunny border, or as parts of geometrical designs in ornamental bedding. Tender species like *S. Sieboldii* and *S. Ewersii* must be potted and given greenhouse protection. For potting, a loamy soil should be used, and a stone or two plunged in it, as they like to develop their roots round them.

Propagation may be effected either by seeds, cuttings, or divisions. Cuttings may be taken at any time, but division of the clumps should be performed in spring to preserve their neat and regular appearance.

Description of Plates 97 and 98. Plate 97 shows the upper portions of the flowering stems of *Sedum spectabile*. Figures 1 and 2 are separate flowers, enlarged and cut through respectively.

Plate 98 represents two of the greenhouse species—A, *S. Sieboldii*, and 1, an enlarged flower; B, *S. sarmentosum*.

HOUSELEEKS

Natural Order CRASSULACEÆ. Genus *Sempervivum*

SEMPERVIVUM (the old Latin name, from *semper* and *vivum*, living for ever). A genus of about fifty succulent herbs or under-shrubs, with the radical leaves forming dense rosettes, and the stem-leaves alternate. The flowers, which are clustered in cymes which are further united in corymbs or panicles, are white, pink, yellow, greenish, or purple. The calyx is divided into six or many parts, the sepals agreeing in number with the divisions of the calyx. The stamens are usually twice the number of the petals, half of them sometimes imperfect or transformed into carpels. Carpels as many as petals; styles thread-like. The species are natives of Europe, North Africa, Madeira, the Canaries, Western Asia, and Himalaya.

History. *Sempervivum tectorum*, the well-known Houseleek, was introduced to this country from the Continent so long ago that there is no record of its first appearance, and it is now completely naturalised on roofs of cottages and out-buildings. *S. arboreum* came from Portugal two hundred and fifty years ago. *S. canariense* and *S. arachnoideum* were both introduced in 1699, the former from the Canaries, and the other from Italy. *S. soboliferum*,

the remarkable Hen and Chickens Houseleek, was introduced from Austria; and in 1731 *S. globiferum* was imported from Germany. The well-known *S. tabulæforme* is a native of Madeira, whence it was first brought in 1817; and *S. flagelliforme* came from Siberia six years later. Among the more recent introductions may be mentioned *S. Royeni* (1874), known in gardens by half a dozen other names, but whose native country is unknown, and *S. arenarium*, introduced from the Tyrol in 1879.

Principal Species. SEMPERVIVUM ARACHNOIDEUM (cobwebby). Flowering stem 4 to 6 inches high. Leaves oblong-wedge-shaped, covered with minute glandular down; about fifty leaves in a rosette, the tips connected by long white hairs, and the outer leaves reddish brown on the outer side; stem-leaves with tuft of hairs at tip. Flowers crimson, three-quarters of an inch across, in dense cymes, panicled; the petals lance-shaped, nine to twelve in number; June. Plate 99. The var. *Laggeri* is a larger form.

S. ARBOREUM (tree-like). Stem smooth, tree-like, branched, 3 to 6 feet high. Leaves smooth, wedge-shaped, forming rosettes at the top of the branches. Flowers golden yellow in a loose panicle; March to December. The var. *atropurpureum*, when planted out in a sunny position, becomes purple-black in colour; the var. *variegatum* has the green leaves edged with white.

S. ARENARIUM (sand-loving). Flowering stem 6 to 9 inches, downy. Leaves lance-shaped, the edges finely fringed, about sixty forming a rosette. Flowers $1\frac{1}{4}$ to $1\frac{1}{2}$ inch across; petals six, pale yellow; June to August.

S. CANARIENSE (native of the Canaries). Stem 18 inches. Leaves spoon-shaped, hairy, forming a rosette; stem-leaves oval, scattered. Flowers white, with nine or ten slender petals; panicled; June and July.

S. FLAGELLIFORME (whip-like). Flowering stem 3 to 4 inches, closely covered with red-tipped leaves. Leaves lance-shaped, downy above, edges fringed, forty or fifty forming a rosette. Flowers 1 inch across, bright red, six to eight in a cluster; petals twelve; June.

S. ROYENI (Royen's). Flowering stem 1 foot and more high. Leaves broad, 4 inches long, somewhat glaucous, with red-brown tip, edges with stiff fringe; rosettes 3 to 4 inches across. Flowers 1 inch across, in large panicles; petals dull reddish; June to August.

S. SOBOLIFERUM (bearing offshoots). Hen and Chickens Houseleek. Flowering stem robust, 6 to 9 inches, closely invested by leaves. Leaves wedge-shaped-oval, finely fringed, about seventy in a rosette. Small rosettes produced abundantly round the parent, to which they

COBWEBBY HOUSELEEK

(SEMPERVIVUM ARACHNOIDEUM)

Nat. size

PL. 99

are attached only by thread-like stems. Flowers with six or seven pale-yellow lance-shaped petals; in a dense panicle; June to August.

S. TABULÆFORME (table-shaped). Leaves spoon-shaped, fringed, closely packed in a flat rosette. Flowers pale sulphur-coloured, with ten to twelve narrow lance-shaped petals; June and July.

S. TECTORUM (roof-haunting). Common Houseleek, or Jupiter's Beard. Flowering stem, 1 foot long, velvety. Leaves wedge-shaped-oval, with purple tip and fringed edges; fifty or sixty forming a rosette. Flowers nearly an inch across, petals dull purple, lance-shaped, fringed; panicled; July.

Cultivation. *Sempervivums* require no more special treatment than do *Sedums*. They all like a sandy soil, and they do not mind if it is hot and dry. Droughts have little terror for them. They are, therefore, very suitable for the driest coigns of rockwork old walls, old roofs, and so forth. The more tender greenhouse species must have some care taken of them during the winter, but in the middle of summer they may be turned out to decorate the beds or borders with advantage to both plants and beds. They are increased by seeds or divisions. Most of them produce offsets, and these, if separated, will soon send out independent roots and grow. Several of the species found in Madeira, *i.e. S. arboreum*, *S. dorami*, etc., are handsome greenhouse plants thriving in a strong loamy soil.

Description of Plate 99. *Sempervivum arachnoideum*, the Cobweb Houseleek, is here shown of the natural size. Fig. 1 is a section, through a much-enlarged flower.

MYRTLE

Natural Order MYRTACEÆ. Genus *Myrtus*

MYRTUS (*Myrtos*, the old Greek name). An extensive genus comprising about one hundred species of stove and greenhouse trees or shrubs. They vary greatly in size, from the dwarf *M. nummularia*, which spreads along the ground in the Falkland Isles, to the 30-feet tree of *M. coriacea*. The leaves are opposite and feather-veined, in some cases fragrant. The flowers consist of a top-shaped calyx-tube with four or five lobes; an equal number of spreading petals; twice as many, or an indefinite number of stamens; an ovary one- to six-celled, with simple style and stigma. The fruit is a dry or fleshy berry. The species are distributed throughout Tropical, Extra-tropical, and Western South America, Australia, New Caledonia, New Zealand, and the Mediterranean region.

History. One species of *Myrtus* has been held in great esteem from the most ancient times, and regarded as sacred to Venus. Of this, the typical species, *M. communis*, the Greeks wove the leafy shoots into wreaths for the victors in the Olympic games, and in other ways dignified it. To-day it is esteemed on account of the perennial freshness and fragrance of its varnished leaves, and the brightness of its sweet-scented flowers. Although none of the species is hardy throughout Britain, *M. communis* endures the winter temperature of the extreme South and South-West of England. Even in other parts it may last for several years, and attain considerable size, but a little extra severity in the winter kills it right off. The Common Myrtle was introduced to Britain from Southern Europe in 1597, and other species have been brought from China, South America, and the West Indies since, but *M. communis* is the only one in general cultivation.

Principal Species. MYRTUS COMMUNIS (common). Common Myrtle. Stem branching, 3 to 10 feet high. Leaves oval or lance-shaped, entire, glossy, marked with transparent dots. Flowers white, solitary from the axils; July. There are several varieties distinguished by the narrowness, broadness, or variegation of their leaves, and in the single or double flowers. **Plate 100.**

M. UGNI (the name of a former genus). Myrtilla. Stems 4 feet high. Leaves oval, pointed, smooth, the margins turned back, darker above than beneath. Flowers white or pink, axillary, solitary; May. Fruit globular, glossy, red or black, aromatic and edible. One plant in fruit will perfume the greenhouse. Its fruits are made into a preserve in some parts of Cornwall, where it is grown in kitchen-gardens. Native of Chili (introduced 1845). Greenhouse perennial.

Cultivation. The soil most suitable for the Myrtle is sandy loam to which leaf-mould has been freely added. In outdoor cultivation they should be planted against a wall in a sunny position, where the wood will have a chance to ripen, and where some slight protection can be set up in winter. Their treatment in the greenhouse is easily compassed, if they are planted in the compost mentioned. During summer, care must be taken that the pots never get dry; they should, on the contrary, have plenty of water at this period, and be treated to frequent syringings. Propagation is effected by cuttings from partially-ripened wood, inserted in a close frame until well-rooted.

Description of Plate 100. A portion of a flowering branch of *Myrtus communis*, with the flowers in all stages of development, but mostly after the fall of the petals and stamens. Fig. 1 is an enlarged drawing of a section through the flower.

MYRTLE

(MYRTUS COMMUNIS)

Nat. size

PL 100

POMEGRANATE

Natural Order Lythrarieæ. Genus *Punica*

Punica (from the ancient name *Malum punicum*, or Punic Apple, probably derived from *punicans*, ruddy). A genus comprising one solitary species, whose description will render unnecessary our usual divisions of matter. It has been in cultivation from very early times, the cool and refreshing pulp being greatly valued in warm climates. It appears to be a native of Persia and the neighbouring region, whence it has been introduced into the Tropics, and there widely cultivated. Our own country received the plant in the year 1548, and it was formerly far more widely grown here than is the custom at present. As it is very rarely that fruits ripen, or that even the flowers properly develop here, it is not to be wondered that more manageable plants have in a measure ousted it from our gardens.

Species. Punica Granatum (grains). Stem woody, 20 to 30 feet high. Leaves oblong or lance-shaped, entire, without the dots noticed in *Myrtus*. Flowers usually scarlet, occasionally white or yellowish; calyx thick and fleshy at first, afterwards leathery, top-shaped, with five to seven lobes; the petals agree in number with the lobes of the calyx—except, of course, in the double varieties; June to September. Fruit about $3\frac{1}{2}$ inches across, with a tough leathery rind of a golden hue suffused with red. This rind contains a great quantity of tannin, and is made use of in preparing morroco-leather. The fruit is singular from the fact that it is built up of two series of carpels, one above the other. The contained seeds are separately invested with a coating of clear pulp. In the typical form this is sweet to the taste, but in some of the varieties it is acid or astringent.

There is a variety with large double flowers. This flowers annually on a south wall out of doors at Kew. There is also a whitish double-flowered variety. *P. nana* is much smaller in all respects, and scarcely exceeds 5 or 6 feet. The leaves are much narrower, flowers smaller, and the fruit scarcely larger than a walnut. It was introduced from the West Indies as a distinct species in the year 1723.

Cultivation. *P. nana* is grown as a pot-plant for the conservatory, and on a wall in the open air at Kew. In some parts of Germany *P. nana* is grown in the form of little bushes a foot high, and made to flower profusely in autumn. It is used as a decorative plant for

rooms, etc. In the South and South-West of Britain, *P. Granatum* may be grown out of doors, but it should have a warm sunny position. In other parts of the country, large pots or tubs are more suitable for it, as these may be kept in the greenhouse and put out of doors in hot sunny weather. The soil for potting should be a rich loam, the richer the better. It may be propagated by means of cuttings, layers, or suckers.

Description of Plate 101. The extremity of a flowering shoot of *Punica Granatum* is here shown. The flowers come in clusters of two, three, four, or five. Fig. 1 is a section through a flower from which the petals have been removed.

PURPLE LOOSESTRIFES

Natural Order LYTHRARIEÆ. Genus *Lythrum*

LYTHRUM (Greek, *lythron*, blood, gore, in reference to the colour of the flowers). A genus consisting of about a dozen species of herbs or small shrubs, with four-angled branches and entire leaves. Flowers red or purple, axillary, producing honey. Calyx-tube straight, cylindric, with eight or twelve teeth and ribs. Petals four or six. Stamens eight or twelve; ovary two-celled, with thread-like style. The species are distributed throughout the Tropical and Temperate regions of the earth.

Principal Species. LYTHRUM GRÆFFERI (Græffer's). Stems trailing, 1 to 3 feet. Leaves narrow-oblong, lower ones opposite or all alternate. Flowers bright pink, solitary in the axils of all the upper leaves, on short footstalks; June to October. Native of South Europe.

L. SALICARIA (Willow-like). Rootstock creeping. Stems 2 to 5 feet, branched, four- or six-angled. Leaves lance-shaped, opposite or whorled. Flowers an inch across, red-purple, in spiked racemes; July to September. On different individuals three different forms of flowers will be found, the differences being in the length of the styles and stamens, and relating to their cross-fertilisation by insect agency. Native perennial. There are two varieties in cultivation: var. *roseum* and var. *superbum*.

Cultivation. *Lythrums* are easily grown in ordinary garden soil, but a damp position should be given if possible to *L. Salicaria*, which grows chiefly along riversides. It is a charming plant for the edges of lakes or ponds. *L. Grafferi*, from its trailing habit, looks well in a hanging basket or a garden vase. Propagation is best achieved by means of seeds or division.

POMEGRANATE

(PUNICA GRANATUM)

Nat. size

PL. 101

CUPHEAS

Natural Order LYTHRARIEÆ. Genus *Cuphea*

CUPHEA (Greek, *kyphos*, curved, from the shape of the flower). A genus comprising about a hundred greenhouse herbs, often viscid. Leaves oval or lance-shaped, entire, opposite, rarely whorled. Flowers axillary, scarlet, purple, or white, consisting of a long curved calyx-tube, which is brightly coloured, produced below in a short rounded spur, and above into six primary teeth with sometimes six smaller ones. The six petals, too, are small, and sometimes absent altogether. There should be twelve stamens, to agree in number with the other parts, but the twelfth one has been suppressed in development. Capsule two-celled, with long slender style. The species are natives of Tropical and Sub-tropical America.

History. *Cuphea viscosissima*, the stickiest of Cupheas, was introduced from North America in 1776; *C. procumbens* from Mexico in 1816, *C. Melvillei* from Guiana in 1823, *C. miniata* from Mexico in 1843, *C. ignea*, also from Mexico, in 1845. Among the more recent introductions may be mentioned *C. hookeriana* (1877) and *C. Zimapani* (1878), both from Mexico.

Principal Species. CUPHEA CYANEA (blue). Stems 2 feet high. Leaves heart-shaped, hairy. Flower: calyx-tube orange, petals two, small, purple; July. Branches and calyx bristly and sticky. Native of the Andes.

C. HOOKERIANA (Hooker's). Stems 2 to 3 feet, shrubby. Leaves lance-shaped. Flowers vermilion and orange, in dense panicles; June and July.

C. IGNEA (fiery). Stems 1 foot. Leaves smooth, lance-shaped. Flowers solitary, without petals; calyx-tube bright scarlet, with black and white expanded lips; June to August. Plate 102. Known in gardens as *C. platycentra*.

C. LANCEOLATA (lance-shaped). Stems ascending, 18 inches, covered with sticky brown hairs. Leaves broad lance-shaped, blunt, hairy. Flowers bluish in a spike-like, somewhat one-sided raceme; July. Biennial.

C. MINIATA (red). Stems 2 feet. Leaves oval, pointed, covered with white bristles. Flowers solitary, pale vermilion; June to September.

C. ZIMAPANI (Zimapan's). Stems 2 feet high. Leaves lance-shaped. Flowers very dark purple; August and September.

Cultivation. Although *Cupheas* require greenhouse treatment they are very easily grown. All those mentioned above are evergreen perennials, except *C. lanceolata*, which is biennial. Seeds should be sown in pans in January or February and placed in gentle heat. As soon as the seedlings are large enough to handle they should be potted singly in good rich loamy soil, and shifted as growth renders necessary, until they have become nice bushy plants in six-inch pots. When the pots are well filled with roots give liquid manure. If preferred, they may be bedded out in the open air during their first summer, and taken into the greenhouse later. They may also be increased by means of cuttings, struck in March or April in bottom heat. Old plants cut down will produce a number of new shoots from the roots, and if these are taken off and grown in a cool place during the summer they will be kept small and occupy little space in the greenhouse for their first winter, yet make admirable blooming plants for the next season.

Description of Plate 102. A couple of shoots of *Cuphea ignea* with flowers. Fig. 1 is an enlarged view of a flower; Fig. 2 a section of the same.

WILLOW HERBS

Natural Order ONAGRARIEÆ. Genus *Epilobium*

EPILOBIUM (Greek, *epi*, upon, and *lobos*, a lobe or pod; from the position of the flower upon the ovary, which, however, is characteristic of the entire Order). A genus comprising about fifty species of herbs or under-shrubs, with pink or purple (rarely yellow) flowers, which consist of a long and slender calyx-tube with four lobes, four petals, usually two-lobed, eight stamens, four long and four short, a four-celled ovary with thread-like style and clubbed or four-lobed stigma. The species are distributed throughout the Arctic and Temperate regions of the world: ten species are natives of Britain.

Principal Species. EPILOBIUM ANGUSTIFOLIUM (slender-leaved). Rose Bay, or French Willow. Stem round, erect, 2 to 4 feet. Leaves alternate, narrow lance-shaped, stalked, 3 to 6 inches long. Flowers 1 inch across, dark rosy purple; July and August. Native.

E. DODONÆI (Dodens'). Stems erect, branched at top, 12 inches high. Leaves very slender, faintly toothed. Flowers large, rosy purple; July. Introduced from France (1700).

E. HIRSUTUM (hairy). Codlins and Cream. Stems round, 3 to 5

CUPHEA IGNEA

Nat. size

PL. 102

feet, covered with hairs and glandular down. Leaves opposite, lance-shaped, 3 to 5 inches long, half-clasping the stem, and with incurved teeth. Flowers numerous, large, rosy purple; petals broad, notched; July and August. Native.

Cultivation. *Epilobiums* are of such simple culture that their proper place is in the roomy border of a large garden, or in the wild garden. As a matter of fact, when once they have been introduced they take care of themselves, being not over nice in the matter of soil. *E. angustifolium* will require looking after, to prevent its monopoly of the whole garden, by means of its rooting runners. They may be increased by seeds or by root-division. The species readily cross; several natural hybrids are known.

CLARKIAS

Natural Order ONAGRARIEÆ. Genus *Clarkia*

CLARKIA (named in honour of Captain Clark, who accompanied Captain Lewis in the famous Lewis and Clark's expedition, which made the first exploration of the Pacific Coast of America, 1804). A genus consisting of but four species, of which two are well-known garden plants. They are annuals with slender branching stems, and alternate, narrow leaves. The flowers are solitary, axillary; the four petals clawed, the limb usually three-lobed, and the claw toothed. Stamens eight, of which four are short and sterile; stigma with four broad spreading lobes. Fruit a four-celled, four-valved cylindrical capsule. All the species are natives only of North-West America.

Principal Species. CLARKIA ELEGANS (elegant). Stems 2 feet high. Leaves lance-shaped, toothed. Flowers crimson-lake, petals without teeth on the claw; June to August. Introduced from California (1832). This a favourite garden annual, and under cultivation it has produced a number of varieties, both single and double, some with white and pink flowers.

C. PULCHELLA (pretty). Stems 1½ to 2 feet high. Leaves very slender, smooth. Flowers rosy purple, the petals deeply lobed, with a pair of opposite teeth on the claw; June to August. Plate 103. Native of Oregon, etc. (introduced 1826). This is the largest form, and like the preceding species it has produced several garden varieties. The var. *integripetala* has the petals without lobes.

C. RHOMBOIDEA (rhomboid) is a less interesting form with smaller purple flowers, the petals of a rhomboid shape.

Cultivation. The *Clarkias* are easily raised from seeds sown annually in the open border, either between March and May or in the autumn. They are not particular as to the character of the soil, but if this is rich the flowering will be profuse. They do not transplant well; they should therefore be sown thinly where they are to bloom, and be thinned out to a distance of ten or twelve inches. Autumn-sown plants begin to flower much earlier than those that were sown in spring.

Description of Plate 103. Upper portion of *Clarkia pulchella* with buds, flowers, and capsules. The additional figures are—1, a flower enlarged; 2, a stamen enlarged; 3, a cross section of the ovary showing its four-celled structure; 4, the seed, natural size and enlarged; 5, a seedling.

EVENING PRIMROSES AND GODETIAS

Natural Order ONAGRARIEÆ. Genus *Œnothera*

ŒNOTHERA (Greek, *oinos*, wine, and *thera*, hunting; classical name given to some plants whose roots were eaten to provoke the appetite for drink). A genus with about a hundred species, with rare exception, herbs. The leaves are alternate. Flowers solitary, or in leafy spikes or racemes, borne in the axils; large, honey-yielding, white, yellow, red, or purple. Calyx-tube four-angled, four-lobed. Petals four, stamens eight, ovary four-celled, style threadlike, stigma round or four-lobed. With one exception all the known species are natives of America, and but for a few Tropical species these are confined to the Temperate regions. The extra-American species is a native of Tasmania.

History. *Œnothera biennis*, the Common Evening Primrose, and the best known of all the species, was introduced from North America in the year 1629. It has taken so kindly to British soil that in many places it is thoroughly naturalised and grows wild, whilst it has become one of the commonest of plants in cottage-gardens. *Œ. mollissima* was the next arrival, from Argentina, in 1732, followed by *Œ. fruticosa*, from the United States, five years later. *Œ. parviflora* and *Œ. pumila* both came from North America in 1757; the large-flowered *Œ. grandiflora* was introduced from North America in 1778; and *Œ. odorata* from Patagonia in 1790. The latter, which is well known in gardens, has become naturalised on the coasts of Somerset and Cornwall.

CLARKIA PULCHELLA

Nat. size

PL. 103

Many others have been introduced during the present century, among them the species formerly separated under the name of *Godetia*, and which are still known as such in gardens. Of these, *Œ. Romanzovii* was the first, from North America in 1817, followed by *Œ. acaulis* from Chili in 1821, *Œ. amœna* from North-West America in 1826, *Œ. vinosa* from California in 1835, and *Œ. Whitneyi* from California in 1870. The principal reasons for formerly separating them were found in the fact that the Evening Primroses opened their flowers only after the sun had gone down, and were yellow or white in colour; whereas the *Godetias* were open all day, and were of various shades and combinations of rose and purple as well as white. These grounds of separation are now regarded as insufficient. The following species are perennial, except where otherwise stated.

Principal Species.

ŒNOTHERA ACAULIS (stemless). Dwarf, 6 inches high. Leaves all radical, forming a rosette, deeply cut in a pinnate manner. Flowers large, white, turning red as they fade; May to September. (*Godetia acaulis.*)

Œ. AMŒNA (pleasing). Stem semi-erect, branching, 1 to 2 feet. Leaves slender, lance-shaped. Flowers rosy, each petal with a crimson spot; May to September. Annual. Plate 105 (*Godetia amœna*). The var. *rubicunda* has erect stems, 2 feet high, with lilac-purple flowers; it is one of the parents of the numerous garden *Godetias.*

Œ. BIENNIS (biennial). *The* Evening Primrose. Stem erect, branched, 2 to 5 feet. Radical leaves broadly lance-shaped, stem-leaves more slender, faintly toothed and finely downy, especially the midrib. Flowers large, pale yellow, fragrant; June to October. Biennial. The var. *grandiflora* has much larger flowers than the type.

Œ. CALIFORNICA (Californian). Rootstock creeping, horizontal; stems 2 feet. Flowers large, fragrant, varying white to pale pink with yellow centre; July.

Œ. EXIMIA (choice). Stems 9 to 12 inches high. Leaves lance-shaped, downy, deeply but irregularly toothed. Flowers very large, white; July. Native of Rocky Mountains (introduced 1870).

Œ. GLAUCA (glaucous). Stem reclining, 1 to 2 feet high. Leaves smooth, oval, slightly toothed. Flowers large, pale yellow; June to October. Introduced from North America (1812). The var. *Fraseri* has deeper yellow flowers and rich dark green foliage. It blooms profusely throughout the summer, and is one of the best garden varieties.

Œ. LINEARIS (very narrow). Stem slender, branched, 12 to 18 inches. Leaves very slender, lance-shaped, remotely toothed. Flowers yellow, slightly fragrant; June to September. North America (1822).

Œ. MISSOURIENSIS (native of Missouri). Stem prostrate, unbranched, 1 foot high. Leaves lance-shaped, margins and nerves downy. Flowers large, yellow; calyx spotted red; June to August. Introduced from United States (1811). The var. *latifolia*, with broader leaves, is the more desirable form; it is represented on Plate 104 (B).

Œ. ODORATA (perfumed). Stems sub-shrubby at base, branched, 1 to 2 feet high. Leaves lance-shaped, slightly toothed, and wavy. Flowers yellow, becoming red as they fade; April and May. Biennial.

Œ. PALLIDA (pale). Stems somewhat erect, branched, 18 inches high. Leaves smooth, narrow-lance-shaped. Flowers white with yellow centres turning red as they fade; June to September. United States (1826).

Œ. ROMANZOVII (Romanzow's). Stems erect, 1 foot high. Leaves broad-lance-shaped. Flowers violet; June to September. (*Godetia Romanzovii.*)

Œ. SPECIOSA (showy). Stem sub-shrubby, 2 to 3 feet high. Leaves broad-lance-shaped, deeply saw-toothed, almost pinnate, downy beneath. Flowers white, reddening as they fade; March to September. Plate 104 (A).

Œ. WHITNEYI (Whitney's). Stem 12 to 18 inches high. Leaves broad-lance-shaped. Flowers rosy, crimson-blotched, very large, very numerous; June to September. Annual. (*Godetia grandiflora.*) The var. *concolor* has white flowers; var. *flammea*, crimson flowers.

Garden Godetias.

Under cultivation the *Godetia* section has produced several good hybrids and garden varieties which are among the best of hardy annuals, though not nearly so widely known and grown as they deserve. In purchasing seed of these they must be asked for as *Godetias*. *Duchess of Albany* has white flowers, 3 or 4 inches across; the *Duchess of Fife* also has white flowers; *Lady Albemarle*, a spreading dwarf plant, with showy crimson flowers; *Satin Rose*, similar to the last mentioned, but with brilliant rosy flowers; *Princess of Wales*, somewhat taller, with ruby-crimson flowers; *The Bride*, free flowering, white and carmine.

Cultivation.

The cultivation of *Œnotheras* is a simple matter; they may be said to be everybody's plants, for any person may grow them; they only require an introduction into the garden and they will sow and grow themselves. It is true they have some slight preference in the matter of soils, and this is in the direction of those of a sandy nature. The dwarf *Godetias* are very suitable for the herbaceous border, and they may be backed by some of the taller-growing species, such as *Œ. biennis* or *Œ. speciosa*. The tall, coarse-growing sorts are quite at home in the wild garden; those that are small and of creeping

EVENING PRIMROSES

(*A*) ŒNOTHERA SPECIOSA (*B*) ŒNOTHERA MISSOURIENSIS

1/2 Nat. size

habit are suitable for the rock-garden. The annuals must, of course, be raised from seed sown out of doors in spring. The biennials are best sown as soon as the seed is ripe. If sown in March they will often flower in the following autumn, but this is not so desirable. Summer- or autumn-sown plants produce only a rosette of radical leaves their first season, and lay up much material in their thick tuberous root upon which they can draw next year for a profuse display of flowers. The perennials may be propagated by root-division as well as by seeds, and a third course is open in the taking of cuttings in spring and striking them in a cold frame. Some of the more compact, dwarf kinds, as well as the *Godetias*, make capital pot-plants for the cool greenhouse or conservatory.

Description of Plates 104 and 105. Plate 104 contains figures of two species. That marked A A, is *Œnothera speciosa*, whilst B represents *Œ. missouriensis*, var. *latifolia*.

Plate 105 shows one of the most favourite forms of *Œ. amœna*, the garden var. known as *Lady Albemarle*. Fig. 1 is a section through the flower and ovary; 2, the seed, natural size and greatly enlarged; 3, a seedling.

FUCHSIAS

Natural Order ONAGRARIEÆ. Genus *Fuchsia*

FUCHSIA (name commemorative of Leonhard Fuchs, a sixteenth-century German botanist). A genus consisting of about fifty species of shrubs or small trees. Leaves oval or lance-shaped, usually opposite, occasionally in whorls of three. Calyx fleshy, coloured, tube produced above the ovary, limb split into four lobes. Petals four, often of different colour from the calyx. Stamens eight, on long slender filaments. Style twice the length of stamens, with head-like stigma. Ovary crowned with eight honey-secreting glands. Fruit a pulpy berry. With very few exceptions the species are natives of Central and Southern America; those that are not American come from New Zealand.

History. The first discovery of the Fuchsia was made by Father Plumier, who consecrated it to the memory of Fuchs, and published the name in 1703, calling his new species *Fuchsia triphylla*. The history of the introduction and popularisation of this genus has been often told. The story goes that about the year 1788 a sailor who had returned from South America brought with him a growing slip, which he presented to his wife or his mother. This was put in the window and carefully tended in honour of the absent one. In due time

it flowered, and there passed by the house a Mr. James Lee, who was a member of a firm of nurserymen still existing at Hammersmith. Struck by the newness of form and habit, he knocked at the door and offered to purchase the unknown plant, but was at first refused. By perseverance and the gradual increase of the amount offered until it reached a figure that was irresistible to the poor woman, he succeeded at last in carrying off the prize; then "kept it dark," and struck cuttings as rapidly as possible, until he had a large stock when next year he put it upon the market, and realised—it is said—a profit of £300 upon his investment. This was probably *Fuchsia coccinea*, now known as a form of *F. macrostema*. Eight or ten years later another species—*F. lycioides*—was introduced; and these remained the only representatives of the genus in our gardens until 1823, when another variety of *F. macrostema*, known as *gracilis*, was introduced. In the next few years several others were discovered, including *F. venusta*, *F. thymifolia*, and *F. arborescens*, all American species. The beautiful *F. fulgens* came from Mexico in 1830. The pretty, creeping *F. procumbens*, grown so much for the sake of its large crimson berries, is one of the New Zealand species (introduced 1874). *F. penduliflora* from tropical America is another recent (1879) introduction. These are the principal natural species, but from the early part of the present century Fuchsias have been so widely cultivated, have sported and been crossed to such an extent, that it is not always an easy matter to refer garden specimens to their proper types. In addition some distinctly new forms, such as *F. corallina* and *F. dominiana*, have been evolved by horticultural skill.

Principal Species.

FUCHSIA CORALLINA (coral-red). Stems woody, 20 feet high in suitable places; young stems red. Leaves with reddish upper sides, dark crimson beneath; in whorls of four or five. Flowers pendulous; calyx crimson, corolla dark plum-colour; May to October. Grows luxuriantly in South-West England. Of garden origin.

F. CORYMBIFLORA (bunch-flowered). Stem branched, 4 to 6 feet. Leaves broad-lance-shaped, with red midrib; opposite. Flowers scarlet in terminal clusters; June to September. Native of Peru (1840).

F. FULGENS (shining). Stem 4 to 6 feet. Leaves heart-shaped-oval, toothed, shining; opposite. Flowers scarlet, large; calyx tapering, petals very short; in drooping terminal racemes; June to September. Plate 107.

F. MACROSTEMA (large-stamened). Stems branched, 6 to 12 feet. Leaves oval, toothed, three in a whorl. Calyx scarlet, petals purple: July to October. There are several good varieties of this: var. *globosa* has the unopened flowers of a somewhat globular form; sepals

GODETIA—"LADY ALBEMARLE"

(ŒNOTHERA AMŒNA, *var.*)

Nat. size

PL. 105

purplish red. The very hardy and well-known *F. riccartoni* is descended from a seedling of this variety. The var. *gracilis* has very slender flowers, a character specially noticeable in the unopened bud. Both these forms are represented on Plate 106. *F. coccinea* is also a variety with dark crimson flowers. All the forms of *F. macrostema* are hardy in the warmer parts of England.

F. PENDULIFLORA (hanging-flowered). Leaves large (3 to 4 inches long), oval, smooth. Flowers trumpet-shaped, rich crimson, shaded with maroon, 3 or 4 inches long; March. Native of tropical America (1879).

F. PROCUMBENS (trailing). Stems trailing. Leaves round, small. Flowers small, erect, calyx-tube yellow, corolla blue; May to October. Berries large, crimson, remaining attached during the winter; very ornamental.

F. SPLENDENS (splendid). Stem 6 feet. Leaves heart-shaped. Flowers orange-scarlet, tips of sepals green; May and June. Greenhouse. Native of Mexico (1841).

F. TRIPHYLLA (three-leaved). Stems 1 to 2 feet. Leaves small, purplish beneath, bronze-green above. Flowers similar to those of *F fulgens*, petals shorter than sepals; brilliant orange-scarlet, in terminal racemes. Native of West Indies.

Garden Varieties. These are exceedingly numerous, and a list of only the best would fill many pages. As in similar cases, we can but give a brief selection from among the best to serve as a suggestion; but it must be remembered that many new varieties are put upon the market every season, and all such lists should be supplemented by the catalogue of a good trade grower. For our purpose it will be well to classify them first under the respective heads of Single- and Double-flowered, and then under the colour of calyx and corolla.

SINGLE-FLOWERED SECTION.

WHITE CALYX.
Corolla coloured as stated.
Alba coccinea, rose.
Antigone, orange-red.
Beauty of Clyffe Hall, carmine-pink.
Beauty of Swanley, pink.
Eynsford Gem, rose-lake.
Lustre Improved, orange-scarlet.
***Mrs. F. Glass*, deep pink, tinted violet.**
***Mizpah*, purplish crimson.**
Rose of Castile, purple.

RED CALYX.
Corolla coloured as stated.
Abundance, dark purple.
Amie, dark purple.
Charming, dark purple.
Delight, pure white.
Enoch Arden, indigo changing to reddish violet.
General Gordon, plum-coloured.
King of the Fuchsias, purplish.
Salopia, pale purple.
Swanley Gem, rose colour.

STRIPED SECTION.
***Beauty*, calyx rosy, corolla plum-coloured.**
***Bland's New Striped*, calyx scarlet, corolla purple striped rose.**
***King of the Stripes*, violet-blue striped red.**
***Lord Wolseley*, calyx deep red, corolla crimson and bluish purple.**
Striata Perfecta, calyx white, corolla carmine and white.

SELF-COLOURED SECTION.

Admiral Gervais, bright carmine.
Beaconsfield, orange-red.
Dr. Sankey, ruby-red.
Fireworks, dark ruby.
Monarch, bright red.
Sedan, crimson-red.
Snowcloud, white.

DOUBLE-FLOWERED SECTION.

Auguste Hardy, scarlet cal., rosy-violet corolla.
Alphonse Daudet, scarlet calyx, deep violet corolla.
Berliner Kind, red calyx, white corolla.
Boreatton, crimson calyx, deep purple corolla.
Comte Leon Tolstoi, red calyx, blue-black corolla.
De Montalivet, rosy calyx, light blue corolla.
Eugène Verconsin, rosy white and slaty blue.
Marvellous, calyx red, corolla blue.
Mignonne, red calyx, pure white corolla.
Pink Perfection, creamy calyx, violet corolla.
Rose Phenomenal, very large, rose coloured.
White Phenomenal, white corolla.

Cultivation. Fuchsias of all kinds are most readily propagated by cuttings, which root with freedom at nearly all times. For this purpose cut off portions of the growing shoots that give no sign of flower buds. These should be put in pans of light soil and moist warm frames. When the young plants are rooted transfer them to beds of light, but very rich soil, in which they will come on rapidly if treated to abundant moisture; or pot them singly, with the same treatment as regards soil and moisture. When the pots are well filled with roots, liquid manure may be given freely; and abundance of water should never be withheld. For the obtaining of new varieties hybridisation must be carefully attended to, the flowers marked, and the ripening of the berries watched. The seeds are embedded in pulp, which must be washed away, and the seeds sown at once. To obtain a suitable soil that is at once rich and light, dried cow-dung should be mixed with double the quantity of loam, neither being finely powdered. With such a compost the best results will be obtained, but all the same Fuchsias will do well in almost any garden soil. Except in the extreme south and west of our islands, Fuchsias out of doors must be cut down on the approach of hard weather, and the stump covered with a little heap of dry coal-ashes to keep off the frost. Pot-plants should be wintered dry and in a cool place.

Description of Plates 106 and 107. Plate 106 illustrates two of the forms of *Fuchsia macrostema* — A, the var. *globosa*, and B, the var. *gracilis*. Figs. 1 and 2 are sections through these forms respectively.

Plate 107 shows a couple of flowering shoots of *F. fulgens*; in one the flowers grow singly from the leaf-axils; in the other they form a terminal cluster. Fig. 1 is a section of the flower, from which it will be seen clearly how cross-fertilisation is favoured. Long-tongued bees or lepidoptera seeking to obtain the honey secreted at the narrow end of the long tube use the clapper-like style as an alighting stage, and crawl partly up it. The pollen from the anthers may fall upon the style, but not upon the stigmatic surface which is beneath. The bee crawling

(*A*) FUCHSIA GLOBOSA

(*B*) FUCHSIA GRACILIS

Nat. size

PL. 106

up takes away some of the pollen on the under-side of its body, and on visiting another flower this portion of its body will be drawn over the stigma, and so the plant will be fertilised.

GAURAS

Natural Order ONAGRARIEÆ. Genus *Gaura*

GAURA (from the Greek *gauros*, proud or superb). A genus of about twenty annual or perennial herbs or shrubs with simple, alternate leaves varying in outline. The flowers agree in general with *Œnothera*, but the calyx-tube is three- or four-angled, the petals more slender, white or rosy, turning red when fading; the fruit a hard woody nut with three or four prominent angles, and usually four-celled. As a rule the petals have a tendency to take the same upward direction; and the flower-cluster is a long terminal spike-like raceme. The species are natives of the warmer portions of North America.

Principal Species. Only one of the Gauras may be said to be a cultivated plant, and that we fear is but slightly known, and seldom seen. This is the species figured in Plate 108.

GAURA BIENNIS (biennial). Stems 4 to 6 feet high. Leaves oblong-lance-shaped, slightly toothed. Flowers irregular; sepals purple tipped; petals white, then reddish, irregularly arranged; August to October. Introduced from North America (1762).

G. LINDHEIMERI (Lindheimer's). Stems slender, branching, 4 feet high. Leaves narrow-lance-shaped. Flowers white, or purple tinged; June to September. Perennial. Native of Texas (1850).

Cultivation. Gauras are propagated by means of seed sown early in spring, out of doors, and in a light soil. The seedlings should be pricked into their flowering quarters as soon as they are large enough to handle. During hard weather in winter they will need some protection in the shape of a movable frame, or dry fern and bushes; or they may be taken up in autumn, potted and kept in a cool house until April or May. Gauras may be usefully employed in beds or baskets where lightness of effect is wanted to relieve heavier subjects.

Description of Plate 108. *Gaura Lindheimeri* is represented by the terminal portion of two flowering shoots, natural size. The additional figures are—1, a separate flower; 2, a section of the same.

CHILI NETTLES

Natural Order LOASEÆ. Genus *Loasa*

LOASA (authorities differ as to the significance of the name; it has been variously stated to be derived from the name of a Spanish botanist, from the South American native name, and to be of unknown meaning). The genus includes about fifty species of climbing or trailing herbs clothed with stinging hairs. The leaves may be simple or compound in character, opposite or alternate. The flowers are somewhat singular in character. The calyx is five-parted; the petals five, hooded, alternating with five large scales which have three filaments at the back and two awl-like processes within. Stamens numerous, in bundles opposite the petals. The ovary is one-celled, ending in a three-lobed stigma, and developing into a large capsule opening by valves. The species are restricted to tropical America.

History. Very few of the species are known in gardens, and all are of recent introduction. *Loasa acanthifolia*, *L. nitida*, and *L. lateritia* were the first representatives of the genus to arrive; they came from Chili about 1822. *L. incana* and *L. hispida* followed in 1830; the first from Peru, the second from Lima. *L. Pentlandii* came from Peru in 1840, and *L. picta* from the mountainous regions of the same country eight years later. *L. vulcanica* was introduced from Ecuador in 1877, and *L. prostrata* from Chili in 1879. The name of Chili Nettles has been given to them because several species are highly dangerous to those who happen to touch them, the bristly hairs being hollow and conveying some irritating fluid to the wounds they have made. For this reason they are not altogether desirable species for the garden, as some tender-skinned persons suffer acutely when near such plants.

Principal Species. LOASA LATERITIA (brick-red) is the best-known and most widely-cultivated member of the genus. It is a climbing plant with deeply-lobed, somewhat pinnate, opposite, stalked leaves, and large flowers. The petals are brick-red, and the scales yellow. The flowers are borne singly on long stalks from the axils of the leaves, and appear in May. It is really a perennial plant, but in this country is generally grown as an annual. Half-hardy.

L. PENTLANDII (Pentland's). Stems 4 feet high. Leaves stalked, opposite, sub-erect. Flowers 2 inches across; petals orange tipped with white, spreading; May and June. Annual.

L. PROSTRATA (prostrate). Stem trailing, flexuous. Leaves some-

FUCHSIA FULGENS

1

Nat. size

PL. 107

what heart-shaped, angled, opposite, without stalks. Flowers solitary, yellow; June to August. Annual.

L. VULCANICA (volcanic). Stems erect, 3 feet high. Leaves with three to five cut lobes, arranged palmately. Flowers about $1\frac{1}{2}$ inch across; petals white; scales red striped with white and yellow; June to August. Annual.

Cultivation. All the cultivated species whether annual or perennial are generally treated as annuals, for summer bedding. The seeds are sown, in March, in pans of light sandy soil, and these placed in gentle heat; or out of doors in a sunny border in May. When sufficiently grown the seedlings should be planted out at distances regulated by the erect or climbing habit of the species. They do best in light soils with a sunny position; otherwise requiring no special treatment. Where it is desired to grow the perennials *as* perennials, they must be lifted early in October and wintered in a cool greenhouse. In handling the plants, care should be taken to avoid being stung by the hairs, which are similar in their action and effects to those of our native Stinging Nettles.

Description of Plate 109. The upper portion of the stem of *Loasa lateritia* with leaves, unopened bud, expanded flower, flower from which the petals have fallen, and the twisted capsule. Fig. 1 is a section through the flower; 2, the seed, natural size and enlarged; 3, a seedling.

MENTZELIAS

Natural Order LOASEÆ. Genus *Mentzelia*

MENTZELIA (named in honour of Christian Mentzel, a botanist of Brandenburg, 1622–1701). A genus of herbaceous plants, with coarsely toothed, alternate or nearly opposite leaves, and orange or white flowers, which in most species expand only under direct influence of the sunshine, though several on the contrary wait until evening before opening. They differ from *Loasa* chiefly in the absence of the large scales from between the petals, the flatness of the latter, the more numerous stamens, and in the seed-vessel being untwisted. The plants, though not free from hairs, do not sting. The species are all American.

History. The most familiar species of *Mentzelia* are better known under the name of *Bartonia*, in which genus certain of them were formerly comprised. The plant figuring in seedsmen's catalogues as *Bartonia aurea* is more correctly named *Mentzelia Lindleyi*. The first species to be introduced was *M. aspera* from the United States

in 1733. *M. nuda* and *M. ornata* followed from Missouri nearly eighty years later, and the next year (1812) saw the introduction of *M. oligosperma* from Louisiana. *M. hispida* came from Mexico (1820), *M. albescens* from Chili (1831), *M. Lindleyi* from California (1834), and *M. bartonioides* from the Western States in 1849. *M. albicaulis*, a white-stemmed, low, branching plant, produces oily seeds which are pounded by the American Indians and used in the production of a kind of cake for food.

Principal Species. MENTZELIA ALBESCENS (becoming white). Stem white shining, 1 to 4 feet high. Leaves with wavy teeth Flowers in a leafy panicle; petals ten, pale yellow; July. Biennial.

M. BARTONIOIDES (Bartonia-like). Stems succulent, 1 foot high. Leaves broadly heart-shaped, lobed and toothed. Flowers solitary; petals five, sulphury yellow, paler beneath; June to August. Half-hardy annual.

M. LINDLEYI (Lindley's). Stems 2 to 3 feet high; branches whitish. Leaves deeply cut into narrow lobes in a pinnate manner. Flowers with five golden-yellow petals, red at the base; June to August. Annual. A splendid plant for borders.

M. ORNATA (adorned). Stems 2 feet high. Leaves with large, jagged teeth, bristly. Flowers large, white, petals ten, closed all day, opening only in the evening, when it becomes fragrant; July to September. Annual.

Cultivation. Ordinary garden soil will be found agreeable to the species of *Mentzelia*, but where a choice is possible let it be light and the position sunny. They are propagated by seed, which should be sown in April in gentle heat; or in a sunny border outside in May. When sufficiently grown the April-sown plants should be potted singly in small pots and brought on in a cool greenhouse, hardened, and then planted in bed or border. Those sown out of doors had better be left where sown, but of course they will need to be carefully thinned out. *M. Lindleyi* is quite hardy, and may be grown out of doors in the same way as Mignonette or Virginian Stock. From the large size and the abundance of its golden flowers, it is one of the brightest and best of hardy annuals. It is also a useful plant for cultivation in pots for the decoration of the conservatory, requiring a light rich soil and frame treatment until it flowers.

Description of Plate 110. The upper portion of a stem of *Mentzelia Lindleyi* with flowers and unopened buds. The separate figures are—1, section through flower; 2, seed, natural size and enlarged; 3, a seedling.

GAURA LINDHEIMERI

Nat. size

PL. 108

PASSION-FLOWERS

Natural Order Passifloreæ. Genus *Passiflora*

Passiflora (Latin, *passio*, passion, and *floris*, a flower). A large genus —one hundred and twenty species—of herbs and shrubs, chiefly climbers, with alternate, lobed, or entire leaves, and undivided tendrils. Flowers produced in the axils, solitary or in racemes. The calyx-tube is short and urn-shaped with four or five lobes, often coloured on the inner face. The petals agree in number with the calyx-lobes, and alternate with these in the expanded flower, but are more deeply coloured. Inside these, and springing from a ring surrounding the base of the column, is a whorl of filaments, forming what is known as the corona. These are quite distinct from the stamens, and are really appendages to the petals. There are four or five stamens whose anthers are connected with the filaments by their middle. The ovary and stamens are supported by a stout column termed the gynophore, and from the summit of the ovary three styles with dilated stigmas radiate. The genus is chiefly American.

History. *Passiflora incarnata*, the May Apple, from the Southern United States, appears to have been the species first introduced to English gardens, or more correctly to English greenhouses, for it is a tender plant. *P. laurifolia*, from the West Indies, and *P. suberosa*, var. *minima*, from Curaçoa, followed in 1690. *P. cærulea*, the well-known and fairly hardy species, arrived in 1699 from Brazil. From this period new species were frequently being introduced, though many of these had no special horticultural interest; but in 1768 *P. quadrangularis*, the Granadilla, was brought from Nicaragua; in 1815 *P. racemosa*, the parent of several good hybrids, came from Brazil; and five years later the showy *P. coccinea* was introduced from the same country, whence also came *P. alba* (1830) and *P. raddiana* (1831). *P. amabilis*, another red species, from South America, appeared here in 1848. *P. Innesii*, a fine hybrid, was produced in 1870 by crossing *P. alata* and *P. macrocarpa*. Several species produce edible fruit, viz. *P. alata*, *P. edulis*, *P. laurifolia*, *P. macrocarpa*, *P. maliformis* (Sweet Calabash), and *P. quadrangularis*. These all mature their fruits annually in the houses at Kew. We must not close this notice without reference to the popular name of these plants, which is reflected in the Latin name of the genus. The early missionaries to South America saw in the various floral organs convenient symbols of the Passion of the Saviour. The stigmas were the three nails used in the Crucifixion, the stamens were

the hammers wherewith the last were driven in; or, as others put it, the anthers are the five wounds, the "corona" is either the crown of thorns or the rays of glory. The ten floral leaves (sepals and petals) are the apostles, Peter and Judas being absent. The tendrils are scourges, and the palmate leaves are the hands of the persecutors.

Principal Species.

PASSIFLORA ALATA (winged). Stems four-angled, winged. Leaves oval-heart-shaped, smooth. Flowers large, fragrant; upper side of sepals and petals deep crimson; rays variegated, white, crimson, and purple; April to August.

P. AMABILIS (lovely). Stems slender, rounded. Leaves thin, entire, oval. Flowers red, with white rays; May.

P. CÆRULEA (azure-blue). Leaves with five oblong, entire lobes. Flowers greenish white, faintly scented; the rays in a double series, purple, white, and blue; blue being the most conspicuous colour in the flower; June to October. Greenhouse. Fruit egg-shaped, yellow. The var. *Constance Elliott* has white flowers.

P. CINNABARINA (cinnabar-red). Leaves with three or five ovate, entire lobes; the base of leaf heart-shaped. Flowers scarlet; March. Native of Australia. Greenhouse.

P. COCCINEA (scarlet). Leaves oval, smooth, coarsely toothed. Flowers scarlet, with orange rays; June to October.

P. EDULIS (edible). Leaves three-lobed, toothed, smooth. Flowers purplish white, fragrant; July and August. Fruit abundantly produced, purplish, with juicy pulp the colour and flavour of an orange.

P. INCARNATA (flesh-coloured). May Apple. Stems annual, herbaceous. Leaves with three lance-shaped, toothed lobes. Flowers fragrant, pinkish white, with double series of purple rays; July and August. Fruit orange-coloured with yellow pulp. Greenhouse.

P. QUADRANGULARIS (square-stemmed). Granadilla. Branches winged. Leaves heart-shaped, smooth. Flowers large, highly fragrant, sepals white, petals red; rays in five series, white and violet; outer series longer than petals; August and September. Fruit greenish yellow, oblong, 6 inches in diameter; pulp purple. Stove.

P. RACEMOSA (racemed). Leaves three-lobed, somewhat peltate. Flowers deep red, in long pendulous racemes; March to October. Stove.

P. RADDIANA (Raddi's). Leaves three-lobed, purplish beneath. Flowers rich blood-red; rays purple; August to October. Often called *P. Kermesina*. Stove.

P. WATSONIANA (Watson's). Habit and leaves as in *P. raddiana*. Flowers lavender and blue, very fragrant; summer. Stove.

LOASA LATERITIA

Nat. size

PL. 109

Garden Varieties and Hybrids.

Alato-cærulea. Flowers white; rays black, blue, and white. Hybrid between *P. alata* and *P. cærulea.*

Albo-nigra. Flowers white; rays dark purple and white. Hybrid between *P. alata* and *P. raddiana.*

Belottii. Flowers rosy flesh; rays blue, barred purple. Hybrid between *P. cæruleo-racemosa* and *P. quadrangularis.*

Bijou. Probably a hybrid between *P. racemosa* and *P. raddiana.*

Buonapartea. Probably a hybrid between *P. alata* and *P. quadrangularis.*

Cæruleo-Kermesina. Probably a hybrid between *P. cærulea* and *P. raddiana.*

Cæruleo-racemosa. A purple-flowered hybrid between *P. cærulea* and *P. racemosa.*

Chinensis. A garden form of *P. cærulea.*

Colvillei. Whitish flowers. Hybrid between *P. cærulea* and *P. incarnata.*

Comte Woronzoff. A form of *P. raddiana.*

Constance Elliott. A fragrant white-flowered seedling form of *P. cærulea.*

Decaisneana. A carmine-flowered hybrid between *P. alata* and *P. quadrangularis.*

Imperatrice Eugénie. Reddish lilac. Probably a hybrid between *P. cærulea* and *P. quadrangularis* or *P. alata.*

Innesii. Flowers whitish, red specked. A hybrid between *P. alata* and *P. macrocarpa.*

Lawsoniana. Flowers brownish red. Hybrid between *P. alata* and *P. racemosa.*

Loudoni. A hybrid between *P. raddiana* and *P. racemosa.*

Cultivation. *Passifloras* are propagated by cuttings or seeds. The new shoots are taken off when about 6 inches long, with a heel of old wood, and these will be found to root quite easily if planted separately in small pots filled with sandy soil. Cuttings of *P. cærulea* will strike out of doors, but it is a more certain method to keep them in a close frame, or covered by a bell-glass in the greenhouse. All the species, except *P. cærulea,* require greenhouse or stove treatment for successful flowering, and should be planted in a large pot, tub, or a shallow border. If there is no restriction of the roots these will wander to great distances and send up suckers where not desired. We have known them to penetrate foundations and send up shoots inside the dwelling-house against which they were planted. They are thirsty plants, but good drainage is a necessity. Turfy loam with an admixture of peat and sand will be found to suit them admirably, though ordinary garden soil will give good results. They all enjoy a liberal allowance of sunlight; they are therefore adapted for training under the roof-glass of an unshaded greenhouse or conservatory. *P. cærulea* forms an excellent screen.

Propagation may also be effected by layering as recommended in the case of *Clematis.* (See vol. i. p. 6.)

Description of Plate 111. Part of a shoot of *Passiflora cærulea,* with leaves, buds, and open flower. Fig. 1 is a section through a flower showing the remarkable structure.

BEGONIAS

Natural Order Begoniaceæ. Genus *Begonia*

Begonia (name given in honour of Michael Begon, a French patron of botany). An extensive genus comprising about three hundred and fifty species, chiefly succulent herbs or under shrubs, and a few climbing plants, many of them having perennial tuberous rhizomes. Their leaves are more or less unsymmetrical, entire or lobed or toothed; often handsomely blotched with white and veined with red. The flowers are in many cases large and showy, bright coloured, white, yellow, scarlet, or rosy, the anthers and stigmas borne in separate flowers. The male flowers have four sepals, the female five. Stamens numerous, the filaments sometimes united at their base. Styles two to four, the stigmas branched or twisted. The fruit a capsule, frequently with wings, seeds minute. The species are distributed through moist tropical lands, and are especially abundant in South America.

History. The earliest species of Begonia introduced to our greenhouses were shrubby, and came from the West Indies and thereabout. *Begonia nitida* is the first of which there is any record, and it was introduced from Jamaica in 1777. It is still a popular cultivated plant. *B. acuminata* was introduced from Jamaica in 1790, and *B. macrophylla* from the same island three years later. In the present century introductions became more frequent. *B. evansiana* came from China in 1804, and *B. acutifolia* and *B. suaveolens* followed in 1816. And so on, the new species coming in fairly rapidly; but in 1858 the beautiful foliage-Begonias began to assert themselves with the introduction of *B. rex*. But the great impetus to Begonia-growing was given a few years later, when the tuberous-rooted species were introduced from South America. Among these should be mentioned *B. boliviensis* and *B. Pearcei* from Bolivia (1865), *B. Clarkii*, *B. rosæflora*, *B. Veitchii*, all introduced from Peru in 1867, and *B. Davisii* from Peru in 1876. Some of these have come from great altitudes in the Andes, *B. Veitchii*, for instance, being found at an elevation of 12,000 feet above sea-level. From such forms magnificent hybrids have been raised, far exceeding the parent species in size and brilliance, and sufficiently hardy to serve as bedding plants. It is interesting to note, however, that, so far, all attempts to effect a cross between the shrubby section and these Andean tuberous species have failed. Possibly, at no very distant date, the influence of some new species may break down this barrier and give us

MENTZELIA LINDLEYI

Nat. size

PL. 110

tall shrubby plants with the splendid blossoms of the herbaceous tuberous-rooted class.

We shall not pretend to give the characters of all the species that are in cultivation, but only of a few from each section; the numbers, even excluding hybrids and garden varieties, being so large.

Tuberous Begonias.

BEGONIA BERKELEYI (Berkeley's). Stems thick, fleshy. Flowers rosy, in erect panicles; winter. A garden hybrid of uncertain parentage.

B. BOLIVIENSIS (Bolivian). Stem succulent, 2 feet high. Leaves lance-shaped, saw-toothed. Flowers large, scarlet, in drooping panicles; males as large again as the females; June to September. Introduced from Bolivia (1857).

B. CHELSONI (Chelsea). Stem 2 feet. Leaves lance-shaped, oblique. Flowers large, orange-red; June to September. A garden hybrid between *B. Sedeni* (itself a hybrid) and *B. boliviensis* produced in 1874.

B. CLARKEI (Clarke's). Stem purplish, stout. Leaves oblique-heart-shaped; saw-toothed. Flowers large, bright red, numerous, in drooping racemes; June to September.

B. CORIACEA (leathery). Stem 6 inches high, succulent. Leaves kidney-shaped, wider than long, hairy beneath. Flowers large, rosy, in groups of two or three on an erect scape; June to September. Bolivia.

B. DAVISII (Davis'). Stemless. Leaves heart-shaped, shining, sparsely hairy, red beneath. Flowers bright red, in a six-flowered umbel; footstalks and scape red; June to September.

B. EVANSIANA (Evans'). Stem branching, 2 feet high. Leaves oblique, somewhat heart-shaped, lobed and toothed; red beneath. Flowers large and numerous, flesh-coloured; June to September. Nearly hardy. Syn. *B. discolor*.

B. FRŒBELI (Frœbel's). Stemless. Leaves heart-shaped covered with purplish hairs. Flowers large, bright scarlet, in loose drooping cymes; winter. Native of Ecuador (1872).

B. GERANIOIDES (Geranium-like). Stemless. Leaves kidney-shaped, lobed and saw-toothed, rough; stalks red and hairy. Flowers white, in a loose panicle; June to September. A delicate species from South Africa (1866).

B. GRACILIS (slender). Stem erect, 3 feet high, succulent, annual. Leaves distant, semi-heart-shaped, lobed, toothed and hairy; bulbils freely produced in the axils. Flowers large, pink, in the axils of the leaves; June to September. Also known as *B. Martiana B. diversifolia*. Native of Mexico.

B. HAAGEANA (Haages'). Stems numerous, forming a large shrub,

4 feet high, with large red-tinted leaves on red, hairy stalks, and bearing in autumn and winter very large heads of white and red flowers. One of the best. Brazil.

B. NATALENSIS (Natal). Stem succulent, 18 inches high, branched. Leaves oblique, lobed, toothed, white spotted. Flowers pale rose, in axillary cymes; winter. Native of South Africa (1855).

B. OCTOPETALA (eight-petaled). Stemless. Leaves heart-shaped, deeply-lobed and saw-toothed, with downy leaf-stalks three times the length of leaves. Flowers greenish white, males with eight petals, in corymbs; August to October. Native of Peru (1835).

B. PEARCEI (Pearce's). Stem branching, 18 inches high. Leaves narrow-heart-shaped. Flowers large, bright yellow, in axillary panicles; June to September.

B. PICTA (painted). Stem succulent, 6 to 12 inches high. Leaves slightly oblique, heart-shaped, saw-toothed, sometimes variegated. Flowers large, pale rose, on hairy, erect, few-flowered footstalks; August to October. Native of Himalaya (1870).

B. REX. See under Ornamental-leaved Begonias.

B. RICHARDSONIANA (Richardson's). Stem fleshy, branched, 1 foot high. Leaves palmate; lobes with wavy or toothed margins. Flowers white; males with two petals, females with five; in few-flowered axillary cymes; June to September. Native of Natal (1871).

B. ROSÆFLORA (Rose-flowered). Stemless. Leaves kidney-shaped, margins lobed and toothed, red; leaf-stalks, flower-stalks, stipules, and bracts bright red. Flowers 2 inches across, bright rose-red; June to September.

B. SOCOTRANA (Socotra). Rootstock a cluster of pea-shaped buds. Stems annual, 1 foot high; leaves orbicular, much wrinkled, shining, with central stalks; flowers in erect panicles, bright rose-pink, very persistent, produced in winter. Introduced from Socotra in 1880. One of the parents of a most useful race of winter-flowering hybrids, of which *John Heal*, *Winter Gem*, and *Adonis* are now popular. It has also been crossed with *B. rex* and several other species.

B. VEITCHII (Veitch's). Stem short, fleshy. Leaves round-heart-shaped, lobed and cut, margins fringed; junction of nerves marked by patch of bright carmine. Flowers large, cinnabar-red, in couples on tall, thick scapes; June to September.

Shrubby Begonias.

B. ACERIFOLIA (Maple-leaved). Stem succulent, tall. Leaves lobed and saw-toothed. Flowers small, white, in branching cymes; male flowers hairy; May. Native of Quito (1829).

B. CINNABARINA (cinnabar). Stem short, erect. Leaves oblique

PASSION-FLOWER

(PASSIFLORA CŒRULEA)

$^{2}/_{3}$ Nat. size

PL. 111

toothed, 2 to 4 inches long. Flowers red, females very small, on few-flowered stalks; June to September. Native of Bolivia (1848).

B. COCCINEA (scarlet). Stem semi-erect, 2 to 6 feet high. Leaves ovate-oblong, margins waved and toothed. Flowers red, in drooping racemes; stalks red; June to September. Native of Brazil (1842). Also known as *B. corallina*.

B. CRINITA (hairy). Stem fleshy, hairy and bright red, 1 foot high. Leaves heart-shaped, toothed, with hairy red stalks. Flowers rosy, $1\frac{1}{2}$ inch across, in loose branching cymes; May. Native of Bolivia (1870).

B. FALCIFOLIA (sickle-leaved). Stem erect, branching, 1 to 2 feet high. Leaves oblique, toothed, green spotted with white, deep red beneath. Flowers two-petaled, bright red; June to September. Native of Peru (1868).

B. FOLIOSA (leafy). Stem slender, branched. Leaves small, ovate-oblong, numerous. Flowers pinky white, small, numerous; June to September. Native of Colombia (1868).

B. FUCHSIODES (Fuchsia-like). Stem tall, drooping, tinged with red. Leaves ovate-oblong, slightly oblique, saw-toothed, margins tinged with red; arranged in two rows. Flowers deep scarlet, in drooping panicles; June to September. Native of Colombia (1846). A valuable pillar-plant.

B. INCARNATA (fleshy). Stem fleshy, erect, 2 feet high, reddish, with swollen joints. Leaves oblique-heart-shaped, with waved teeth. Flowers rosy, large; winter. Native of Mexico (1822). There are some handsome purple-leaved varieties of this, viz. *A. Mallet, Mdme. Lionel, M. Hardy*, etc.

B. LINDLEYANA (Lindley's). Stem fleshy, erect, covered with rusty hairs. Leaves ovate, irregularly lobed and toothed, woolly beneath, with central stalk. Flowers white; winter. Native of Guatemala.

B. MACULATA (spotted). Stems branching, woody. Leaves oblique, very long, slightly undulating, upper surface blotched with white, under-side bright crimson. Flowers coral-red, in drooping panicles; June to September. Native of Brazil (1821). This is very variable both in colour and markings of leaf, and colour of flower, the latter ranging from red to white.

B. MAGNIFICA (glorious). Stem fleshy, erect. Leaves oblique, toothed. Flowers rosy carmine, in terminal panicles; June to September. Native of Colombia (1870).

B. NITIDA (shining). Stem woody, erect, 4 to 5 feet, branched. Leaves large, oblique, glossy, with rounded teeth. Flowers large, deep rose-colour, in panicles; winter and greater part of year.

B. PLATANIFOLIA (Plane-leaved). Stem erect, 5 to 6 feet. Leaves kidney-shaped, 8 or 10 inches across, bristly on both sides; acutely lobed and toothed. Flowers large, rosy white; June to September. Native of Brazil (1834).

B. RAMENTACEA (chippy). Stem erect, branched, scaly. Leaves kidney-shaped, oblique, red and scaly beneath. Flowers pink and white, drooping; May. Native of Brazil (1839).

Ornamental-leaved Begonias.

B. AMABILIS (lovely). Stem short, fleshy, creeping. Leaves oval, 6 inches long, with rounded teeth, cottony dark green, blotched with white, underside purplish. Flowers white or rosy, in cymes; June to September. Native of Assam (1859).

B. DÆDALEA (variegated). Stem short, thick, fleshy. Leaves large, green; when young, covered with network of scarlet lines, turning russet as the leaf matures; edges velvety. Flowers white and rosy, in loose panicles. Native of Mexico (1860).

B. DECORA. A pretty little species with creeping rhizomes from which the leaves spring; these are 4 inches long, very hairy, and coloured yellow-green, bronzy red, and purple. Introduced in 1895 from Penang.

B. DIPETALA (two-petaled). Rootstock fleshy. Stem erect, 1½ foot high, brown. Leaves oblique, toothed; green and white above, red beneath. Flowers large, with two pink petals, in loose cymes from the axils; May. Introduced from India (1828).

B. GOGOENSIS (native of Gogo, Sumatra). Leaves large, oblique, dark velvety green, with paler midrib and veins; deep red beneath. Flowers pink, in loose panicle. Introduced 1881.

B. HERACLEIFOLIA (Heracleum-leaved). Rootstock fleshy. Leaves radical, palmately-lobed and toothed, on long velvety stalks; bronze-green, hairy. Flowers rose-coloured, in many-flowered cymes, on very long scapes; May. There are several varieties, differing chiefly in the colouring of the leaves. Native of Mexico (1831).

B. NELUMBIIFOLIA (Nelumbium-leaved). Rootstock fleshy, creeping. Leaves large, roundish, 3 feet in circumference, hairy beneath, stalk in middle. Flowers small, white or rosy, in many-flowered cyme, on tall scape; winter. Native of Mexico.

B. RAJAH. A new introduction from Singapore. It has a fleshy rhizome and leaves 6 inches high, smooth, ovate-peltate, coloured lustrous green with large blotches of chocolate brown. A most useful plant for the stove.

B. REX (the king). Rootstock fleshy, creeping. Leaves large, unequally heart-shaped, toothed, hairy; surface blistered, centre and

BEGONIA REX

Nat. size

PL. 112

margins dark green with metallic sheen, the intervening space silvery white. Flowers large, pink, in loose cyme, on erect scape. Native of Assam (1858). Most of the beautiful-leaved Begonias in general cultivation are, in part if not wholly, the offspring of this species. Plate 112. There are hybrids between this and *B. socotrana*, *B. evansiana*, etc., all of them good decorative plants.

B. Thwaitesii (Thwaites'). Leaves radical, heart-shaped, variegated with rich coppery green, purple-red, and white; under-side deep red. Flowers white, in an umbel, on short scape. Humid stove. Native of Ceylon (1852).

Garden Hybrids. It is necessary that the natural species mostly cultivated should be known, but in recent years the garden hybrids have become far more important than their parents from the horticultural point of view. These exhibit great advance in the form, size, and colour of the flowers. They are at present very numerous, and the list is being extended every year. A few of the best may be briefly mentioned:—

Ascotensis is one of the finest; the beautiful pink flowers borne in large clusters. In the South of England this may be used for bedding purposes.

Gloire de Sceaux. Upright habit, with bronzed leaves and numerous large, flat pink flowers, which appear in winter.

Ingramii. Of dwarf habit, with dark foliage and reddish-pink flowers. Suitable for outdoor culture in warm situations.

Knowsleyana. Of more vigorous habit, with blush-tinted flowers, very serviceable for cutting during the first months of the year.

Paul Bruant. Very free bloomer; flowers of a soft pink hue.

President Carnot, *Gloire de Lorraine*, *Triomphe de Lemoine*, and the bedding varieties of *B. semperflorens* are other forms that may be recommended.

Cultivation. Begonias are, as a rule, easily cultivated if one or two essential requirements are observed. The tropical species require a temperature of not less than 55° in winter, and a minimum of 65° in summer. A considerable number may be grown in an ordinary greenhouse, and some are suitable for cultivation in the open air during the warm months of the year. The tropical species require shade in very bright weather, and a liberal allowance of fresh air at all times. They all prefer a light, loamy, well-drained soil. They are propagated by means of cuttings inserted at any time, April being most preferable, as cuttings rooted at that time make large plants by the winter, when Begonias of the shrubby or evergreen section have most value. Some

of them ripen seeds freely, and from these a stock of plants is easily raised. Much interest and pleasure may be derived from crossing one species with another, the fact that the flowers are unisexual favouring hybridisation. Many valuable garden-plants have been raised within the last ten years in this way.

The *Rex* section and all its allies, such as *heracleifolia*, *decora*, *Rajah*, etc., are readily propagated by means of leaves. They are cut across the principal nerves, and, as a rule, from every cut a plant is developed, if the leaves are pegged down flat on sandy soil, and placed in a close frame till the plantlets are large enough to be potted separately. *B. rex* is a most useful plant for shady borders in greenhouses or cool ferneries. It is often used to decorate back walls, which are first covered with wire netting, supporting soil or sphagnum-moss, in which the Begonias are planted at intervals. The *rex-socotrana* hybrids have the double merit of being handsome foliage plants as well as having beautiful flowers. *B. socotrana* requires to be started in brisk heat in August, and grown in a tropical house close to the glass till it flowers in December. The hybrids between it and the Andean Begonias require similar treatment.

Begonias of the *Semperflorens* section, now largely used for summer bedding, are as easily grown as Coleus. Cuttings taken in March from old wintered plants, and struck in heat, soon form plants, which must be hardened off by May, and then planted in beds or borders. They are remarkable for striking leaf-coloration as well as for their flowers.

The Tuberous Begonias proper, that is, those that have been bred from the Andean *B. Veitchii*, *B. Davisii*, *B. Pearcei*, etc., are useful in a variety of ways. Tubers started in heat in January and grown in a warm sunny house, planting them in rich light soil, make beautiful specimens by April or May. Started later, they are at their best in the summer. They may be grown well in an ordinary greenhouse if planted in fresh soil in spring and allowed to grow slowly. Magnificent specimens have been grown in an ordinary conservatory attached to a villa residence. For bedding purposes the tubers need to be started in heat in boxes of sandy leaf-mould, hardened off by June, and then planted in beds or borders about a foot apart. If raised from seeds, these should be sown in February in shallow pans of fine sandy soil, sowing the seeds thinly on the surface and covering with a pane of glass. They require the heat of a warm house to start them. When large enough to handle, they should be transplanted into boxes or pans of very light sandy soil, placing the seedlings about an inch apart, and watering them rather liberally. A position close to the glass in a warm

BEGONIA FUCHSIOIDES

Nat. size

PL. 113

greenhouse is best for them at this stage. When they have grown to touch each other, they should be planted singly in pots in light rich soil. If intended for bedding, five-inch pots are large enough for the final shift, but if wanted for the greenhouse, larger pots still should be given. Choice varieties are multiplied by means of cuttings taken from the tubers in spring when the shoots are a few inches high. Seeds of a good strain of these plants are easily obtained from a Begonia specialist, or selected tubers may be procured cheaply and started in February. The tubers should be wintered dry in a frost-proof frame or shed.

Descriptions of Plates 112-115.

Plate 112. *Begonia rex*, with young and old leaves, and flowers. Although this may be considered natural-sized, the leaves frequently attain a length of 15 or 16 inches. Fig. 1 is a section through the male flower, and Fig. 2 is the female flower similarly treated.

Plate 113 represents *B. fuchsioides*, one of the shrubby section. Fig. 1 is an unopened male flower; Fig. 2, the same fully open; and Fig. 3, a section of the female flower.

Plate 114 illustrates one of the varieties of *B. semperflorens*. Fig. 1 is the female flower, and Fig 2 is the same in section.

Plate 115 is a garden hybrid of the tuberous-rooted section. Fig. 1 is a male flower; Fig. 2, the female, both in section; and Fig. 3 is one of the tubers.

MAMILLARIAS

Natural Order CACTEÆ. Genus *Mamillaria*

MAMILLARIA (Latin, *mamilla*, a little breast, from the breast-shaped tubercles). A large genus (about three hundred species) of succulent perennials, with cylindrical or globular stems covered with numerous tubercles of variable shapes, spirally arranged, and bearing radiating cluster of spines at their apex. The plants in this genus are never tall, one foot being an extreme height, the more general stature being from 3 to 6 inches. The flowers are produced towards the summit of the plant, usually in a zone, each starting from the axil of a tubercle. They are tubular in form, both calyx and corolla coloured rosy, yellow, or white. The stamens are numerous, attached to the side of the tube; the style thick, long, and terminated by a three- to seven-rayed stigma. Fruit a smooth berry, containing many seeds. The

species are confined chiefly to Mexico, Brazil, Guatemala, and the warmer parts of North America, a few West Indian.

History. *Mamillaria simplex*, a native of Tropical America, was introduced from the West Indies as far back as 1690, but for more than a century it appears to have been the sole representative of the genus cultivated here. This is, perhaps, not to be wondered at, when we consider that even to-day the growers of *Cacti* are not very numerous, and the demand for specimens not very pressing. *M. pusilla* was introduced from the West Indies in 1820, and a few others in the earlier years of the century; in 1827 a half-dozen Chilian species were introduced, and a number of Mexican species in 1835, including *M. angularis, M. bicolor, M. cirrhifera,* and *M. haageana. M. Lehmanni, M. sulcolanata,* and *M. rhodantha,* other Mexican species, came in the following year, and the succession of new forms has been maintained since, some remarkable species being of quite recent date. Among these may be mentioned *M. fissurata* (Mexico, 1885).

Principal Species. MAMILLARIA BICOLOR (two-coloured). Stem somewhat club-shaped, 8 or 10 inches high, 2 or 3 inches in diameter, branched near base; covered with dark green tubercles, which are partly hidden by the abundant close-set and spreading spines, which give the whole plant a cobwebby appearance. Flowers small, purple.

M. GRACILIS (slender). Stem cylindrical, not more than a couple of inches high, and half an inch thick. Tubercles small; spines white, spreading. Flowers large, pale yellow. Native of Mexico.

M. PECTINATA (comb-like). Stem conical, or more or less globular, 3 inches high; tubercles short, with rosettes of white spines. Flowers yellow, 2 inches across, fading in about two hours after opening. Mexico.

M. PUSILLA (small). Stem globular, an inch high, with conical greyish tubercles. Spines white and brown. Flowers yellow, tinged with rose.

M. RHODANTHA (rosy-flowered). Stem 3 to 6 inches high, by 2 across, branched with conical tubercles and yellowish spines. Flowers bright rose, numerous.

M. STELLA-AURATA (gold-starred). Stem branched, 2 inches high, by $\frac{1}{2}$-inch across, with short tubercles, and yellow spines in a star-like rosette. Flowers small, white. Mexico.

Cultivation. Mamillarias are greenhouse plants that require a sunny position near the glass. In potting, care should be taken to have perfect drainage, and the soil should be a sandy loam to which has been added some old limy mortar, and some silver sand. During the growing period, they should have frequent waterings, but the soil

BEGONIA SEMPERFLORENS, *var.*

Nat. size

PL. 114

should not get saturated; during winter, water should be almost entirely withheld. Give all possible exposure to bright sunshine, and the plants will do well. Some growers graft the more delicate species upon small rooted plants of *Cereus*. They are easily raised from seeds if these are sown on sandy soil, and placed in a sunny warm position, pricking off the seedlings as soon as they are large enough to handle. Most of the species develop offsets which may be removed and treated as cuttings.

Description of Plate 116. Two species are figured—A, *Mamillaria pusilla*, and B, *M. rhodantha*, both of the natural size. The separate Figures 1 and 2 are an enlarged flower of *M. rhodantha*, and a section through the same.

TORCH THISTLES

Natural Order CACTEÆ. Genus *Cereus*

CEREUS (Latin, wax, or pliant; in allusion to the wax-like fleshiness of the young shoots, or to the pliant stems of some species). A large genus (two hundred species) of succulent stove or greenhouse perennials whose soft flesh contains a woody core. The stems are mostly long and angular, studded with rosettes of spines. The flowers are large and showy, tubular in form, composed of a large number of sepals and petals, most of which are brightly coloured. The stamens also are very numerous, united to the walls of the tube. The style is thread-like, divided at the summit. The species are distributed chiefly throughout Central and South America and the West Indian Islands.

History. The genus *Cereus* has been represented in this country for more than two hundred years, several species having been introduced in 1690: *C. flagelliformis* from Peru, *C. hexagonus* from Surinam, *C. lanuginosus* and *C. triangularis* from the West Indies. Ten years later there came from Jamaica our first examples of *C. grandiflorus*. A few additional species turned up in the eighteenth century, beginning with *C. tetragonus* (1710) from South America, and including *C. heptagonus* and *C. repandus* from the West Indies, *C. peruvianus* from Peru, and *C. Royeni* from South America—all in 1728. Several others were introduced towards the close of last century, but most of the species were unknown in our greenhouses until the present century, during which some of the finest have been introduced. Not many of these, however, may be easily obtained, and we content ourselves with describing a few species only.

Principal Species. CEREUS BERLANDIERI (Berlandier's). A dwarf watery-fleshed species with creeping stems about 6 inches long, and less than an inch thick; ridged, and with hill-like eminences which bear the spines. From the stem grow more upright shoots which support enormous purple flowers (4 inches across) with rosy stamens.

C. COCCINEUS (scarlet). Stems creeping, long-jointed, triangular. Spines white and yellow, rising from yellow cushions. Flowers large and many, scarlet. Brazil (1828).

C. CTENOIDES (comb-like). Stem 4 or 5 inches high, and almost as broad; egg-shaped, with spiral ribs which are closely set with rosettes of long white spines. Flowers bright yellow, 3 or 4 inches across, produced near the summit of plant. Native of Texas.

C. FLAGELLIFORMIS (whip-shaped). Rat's-tail Cactus. Stems prostrate, with ten or twelve low ridges chiefly produced by the longitudinal lines of rosettes of long whitish bristles. Flowers violet-pink or red. Plate 117.

C. FULGIDUS (shining). Stems tall, three- to four-angled, spiny at the joints. Flowers lustrous, orange-scarlet, inner petals deeper red; 6 to 7 inches across. Introduced from Tropical America (1870).

C. GRANDIFLORUS (large-flowered). Stems tall, climbing, angled, bristles from downy rosettes. Flowers about 8 inches long, and nearly a foot across, vanilla-scented, opening in the evening, and fading early in the morning; sepals brown without, yellow within, petals pure white.

C. MACDONALDIÆ (Macdonald's). Stems cylindrical, creeping, branched, about $\frac{1}{2}$-inch in diameter. Flowers more than a foot across, opening at night; sepals numerous, red and bright orange, petals pure white. Native of Honduras.

C. PROCUMBENS (bending down). Stems prostrate, with erect shoots, 3 or 4 inches high; quadrangular, with tufts of spines along the angles. Flowers bright rosy purple, wide-spreading, 3 inches across. A native of Mexico.

C. QUADRANGULARIS (quadrangular). Stems creeping, four-angled and spiny. Flowers white, fragrant, opening only at night.

C. SPECIOSISSIMUS (most showy). Stems erect, 3 to 6 feet, angled, the angles toothed and furnished with prickles. Flowers large, spreading, bright scarlet; stamens white. Native of Mexico (1816).

Cultivation. The directions given for the culture of *Mamillaria* apply in the main to *Cereus* and other genera of CACTEÆ. They should have a winter temperature of something over 50° and be kept in a dry house. In summer they should have plenty of direct sunshine and be watered with care. The plan sometimes adopted of

TUBEROUS BEGONIA—*Hybrid*

Nat. size

PL. 115

turning them outside during the summer is not a good one unless they have shelter from rain; otherwise the stems are likely to be too sappy to stand our winters.

Description of Plate 117. A plant of *Cereus flagelliformis* reduced to about two-thirds of the natural size. Fig. 1, section of a flower.

PHYLLOCACTUS (Greek, *phyllon*, a leaf, and Cactus) is a genus of about a dozen species, natives of Tropical America: shrubby epiphytes, generally clinging by means of their roots to the trunks of gigantic forest trees, and remarkable for their flat blade-like stems, the absence of true leaves, and for the large size and rich colours of their beautiful flowers. They share with *Epiphyllum* the favour of cultivators in this country who do not care for Cacti generally. Many hybrids have been raised from them, and there are several hundreds of named varieties known. All are easily grown in light soil in a sunny position in a warm greenhouse, and often a success in room windows. They are easily multiplied by means of cuttings inserted in small pots in sandy soil or from seeds sown in spring.

The Frontispiece to Volume III. represents *Phyllocactus phyllanthoides*.

EPIPHYLLUMS

Natural Order CACTEÆ. Genus *Epiphyllum*

EPIPHYLLUM (Greek *epi*, upon, and *phyllon*, a leaf: the branches resembling leaves and the flowers growing therefrom). A genus of three or four species, with small, flattened, fleshy branches of trailing or drooping habit, and large showy flowers. Natives of Brazil. *Epiphyllum truncatum* was introduced from Brazil in the year 1818; the forms most generally cultivated are of this species; they need greenhouse treatment.

Species. EPIPHYLLUM TRUNCATUM (maimed). Stem jointed, compressed, the branches ending abruptly, as though cut off. Flowers showy, red or rosy, nearly 3 inches long, from the ends of the branches; stamens white. There are a number of garden varieties, the differences, however, being mere shades of colour. It grows naturally on the trunks of trees, a fact explaining its drooping habit. *E. russellianum* has smaller, narrower branchlets. *E. makoyanum* and *E. Guertneri*, both recent introductions, have stouter branchlets and larger flowers, and are preferable to the above. There are numerous named varieties of *E. truncatum* in cultivation.

Cultivation. They are all tropical in their requirements, and prefer shade and moisture in the summer. They are propagated from cuttings or are grafted upon stems of *Pereskia*, any joint broken off rooting readily; but from the first such cuttings begin to bend over and grow towards the earth. If the plants are desired for a hanging basket or similar arrangement, this drooping habit will recommend it, but otherwise it will, perhaps, be thought better to adopt the plan of grafting upon a stem of *Pereskia* specially grown as a cutting for the purpose. This ensures the plant starting at sufficient height from the soil to enable it to grow down and display its fine flowers. More than one graft can be effected upon the same stock, by inserting the cuttings of *Epiphyllum* at different heights. The operation should be performed in spring, when the growing joints of *Epiphyllum* may be pulled off, and inserted in an incision in the stock, the method of fixing being to use one of the *Pereskia* spines as a peg, and drive it through stock and graft. By this means the graft is retained until a junction of parts has become effected. The compost they prefer is a mixture of peat, loam, and sand in equal parts. They must be allowed only sufficient water to prevent withering, and in February they should be started into growth by giving more water and a higher temperature. They will not open their blossoms in a temperature lower than 60°; but this accomplished, they may be moved to cooler quarters, where their flowers will probably last longer.

Description of Plate 118. *Epiphyllum truncatum* is here represented about one-third less than the natural size, the full dimensions of the flower being more nearly shown in the section marked 1.

INDIAN FIGS AND PRICKLY PEARS

Natural Order Cacteæ. Genus *Opuntia*

Opuntia (classical name used by Pliny). A genus comprising about one hundred and fifty species of succulent trees and shrubs. When old the stems contain a woody core, or may become almost entirely woody, and in various species they are somewhat cylindrical, globular, or flattened. In a young state they have minute fleshy leaves beneath the downy tubercles from which the spines arise, but these drop off early. From the same point the yellow or orange flowers are produced. As usual in *Cacti*, there is no distinction between sepals and petals; but the flowers of *Opuntia* differ from those of the other genera we have

(*A*) MAMILLARIA PUSILLA

Nat. size

(*B*) MAMILLARIA RHODANTHA

Nat. size

described in being open and not tubular. The flowers are succeeded by pear-shaped or egg-shaped spiny fruits; those of some species being known as Prickly Pears, and greatly esteemed for their sweet, cooling, juicy pulp. The species are natives of the tropical and warm portions of America, but some have been introduced to and become naturalised in Southern Europe, the Canaries, and Northern Africa—hence its name of Barbary Fig.

History. *Opuntia vulgaris*, the hardiest of the tribe, and a native of Mexico, etc., was introduced from Southern Europe in that golden year from which we date so many horticultural novelties, 1596. Nearly a century passed by before another species was added to our greenhouses; this was *O. curassavica* from Curaçoa in 1690. *O. ficus-indica* from Mexico, and *O. Tuna*, from the West Indies, were introduced in 1731, *O. nigricans* from South America in 1795, and many less popular species during the present century. *O. Tuna*, by reason of its prickly nature, is largely grown as a hedge-plant, as well as for rearing the valuable Cochineal insect. The same species, as well as *O. ficus-indica* and *O. decumana*, is also much cultivated on account of its juicy fruits (Prickly Pears). From these fruits sugar and water-colours have been prepared, and from them the Mexicans make a beverage called Colinche.

Principal Species. OPUNTIA FICUS-INDICA (Indian-fig). Stem erect, 6 feet high, joints oval, flattened, without spines. Leaves awl-shaped. Flowers yellow; May. Fruit oval, bristly, red within; edible.

O. MULTIFLORA (many-flowered). Erect growing, branches oval, flattened, with numerous clusters of unequal spines. Flowers yellow; June to August.

O. RAFINESQUII (Rafinesque's). Plant spreading, 1 foot high; joints pear-shaped, flattened. Leaves spreading, a few small spines and a long one in some of the axils. Flowers yellow, often with red centre. Introduced from North America (1868).

O. TUNA (American-Spanish name). Stem 20 feet high in old plants; joints with tufts of four to six spreading yellow spines. Flowers dull reddish orange; July. Fruit pear-shaped, 2 or 3 inches long, rich carmine in colour and fleshy.

O. VULGARIS (common). Plant of low stature, spreading; joints broadly oval, flat, dotted with downy eminences from which the leaves have fallen. Leaves thick, awl-shaped, fleshy, a few spines in their axils occasionally. Flowers pale yellow; June to September. This plant is similar to *O. Rafinesquii*, but the joints are more flattened and broader, and the flowers have a smaller number of petals. Plate 119.

Cultivation. The general directions for other genera of CACTEÆ apply to *Opuntia*, except that they will do well in loam without the addition of other substances, though broken brick ensures good drainage. Several species, among which are *O. Rafinesquii* and *O. vulgaris*, are hardy, and may be grown in sunny situations out of doors, if care is taken to secure perfect drainage. A hand-light should be placed over outdoor specimens in winter to protect them from excessive moisture, and very severe frosts. They will ripen their seeds in this country, and these may be used for propagation. More frequently they are raised from cuttings. For this purpose joints should be detached, and laid on a dry shelf for several days, at least until the severed portion has completely dried, and then planted in a pot filled with loam and brick-dust. They should be kept nearly dry until rooted.

Description of Plate 119. A portion of a plant of *Opuntia vulgaris*, showing the shape and thickness of the joints. The small joint in the front of the group is provided with leaves; and beneath the expanded flower, behind it, there is a solitary long spine. The flower in section is shown at Fig. 1.

FIG MARIGOLDS

Natural Order FICOIDEÆ. Genus *Mesembryanthemum*

MESEMBRYANTHEMUM (Greek, *mesembria*, mid-day, and *anthemon*, a flower; the flowers opening more freely when sun is highest). A genus comprising about three hundred species of fleshy herbs or sub-shrubs, with thick fleshy leaves of varied shape and entire or bristly margins. On a casual glance the flowers present a resemblance to those of the Composite order, though of very different structure. Their coloration ranges from white through various shades of red to purple, and through yellow to orange. The sepals vary from four to eight, more or less united; petals of an indefinite number, sometimes entirely absent. Fruit opening by slits in the top taking a star-shape. The species are mostly natives of South Africa, but a few are scattered over Australasia, the Canaries, and the Mediterranean region.

History. A very large number of *Mesembryanthemums* are known to gardeners, and for about a hundred and fifty years they have been widely cultivated. A few have a much longer record of their presence in British gardens. One species—*M. latum*—was introduced in 1620, and *M. edule*, the well-known Hottentot Fig, in

RAT'S-TAIL CACTUS

(CEREUS FLAGELLIFORMIS)

$^{2}/_{3}$ Nat. size

PL. 117

1690. Two others—*M. coccineum* and *M. glaucum*—were introduced about 1696, and *M. crystallinum*, the familiar Ice-plant, was first brought to public notice in 1725. *M. echinatum* and *M. tricolorum* appeared fifty years later, and *M. violaceum* and *M. cymbifolium* in 1820 and 1822 respectively. Many less familiar forms came in between, and there has been a steady procession of new forms all through this century. *M. edule* is grown for its pleasant fruit. The leaves of *M. pugioniforme* are said to be a good substitute for Spinach, and those of *M. tortuosum* to be chewed as a narcotic by the Hottentots. *M. cystallinum* is burnt in great quantities for the use of the glassmaker. A peculiarity of the seed-vessels must be noted. These shrivel up and imprison the seed, but on the approach of the rain that fits the ground for their germination, the vessel becomes plump and turgid. The seeds are thereby pressed out.

Principal Species.

MESEMBRYANTHEMUM COCCINEUM (scarlet). Stems shrubby, erect, 1½ foot high. Leaves three-sided, blunt, somewhat glaucous. Flowers solitary, spreading, scarlet; May to September.

M. CRYSTALLINUM (crystalline). Ice-plant. Stems trailing, spreading. Plant covered with glittering points as though frosted. Leaves egg-shaped, alternate, clasping the stem. Flowers white, in the axils, almost stalkless; May to August.

M. CYMBIFOLIUM (boat-leaved). Stem shrubby, 1 foot high. Leaves thick, keeled, upper surface concave, opposite. Flowers yellow. Plate 120C.

M. ECHINATUM (hedgehog-like). Stem shrubby, erect, branched, 3 to 6 inches high. Leaves swollen, oval-oblong, covered with little spiny points. Flowers yellow, not very striking; August. Plate 120B.

M. EDULE (edible). Hottentot Fig. Stem prostrate, shrubby; branches angled. Leaves three-sided, slightly channelled, keel toothed. Flowers large, solitary, at end of shoots, yellow; July.

M. TRICOLORUM (three-coloured). Stems prostrate, distantly branched. Leaves slender, cylindrical, pointed. Flowers large and bright, on long stalks, straw-coloured, crimson near the centre; April.

M. VIOLACEUM (violet). Stems shrubby, erect, 1 to 2 feet high; branches with a violet tinge. Leaves almost round, obscurely three-sided, glaucous, studded with rough dots. Flowers varying from flesh-colour to violet; June to October. Plate 120A.

Cultivation.

These plants like a rather poor soil; yellow loam to which has been added plenty of sand and old mortar with well-rotted manure will serve admirably. Few of them are sufficiently hardy to be grown without greenhouse protection; but all those

mentioned may be utilised in summer out of doors for edging and ornamental bedding. They are sometimes grown in room windows, very fine specimens being not uncommon in cottagers' windows in this country. Propagation is effected by breaking off small pieces and laying them upon damp sand in full sunshine, and in the course of a few weeks they will emit roots.

Description of Plate 120. A, *Mesembryanthemum violaceum;* 1, A, section of flower. B, *M. echinatum.* C, *M. cymbifolium.* All of the natural sizes.

UMBELLIFEROUS FLOWERS

Natural Order UMBELLIFERÆ

This important Natural Order of plants, comprising one hundred and fifty-two genera and about three hundred species, is singularly poor in garden flowers, though its contributions to the kitchen-garden are neither few nor unimportant. Most of those that appeal to the horticulturist do so not on account of their flowers, but of their much-dissected and handsome foliage. Several species of *Eryngium* (allied to our native Sea-holly) are occasionally cultivated for the sake of their stiff glaucous leaves and heads of small blue flowers. *Astrantia major*, the Black Masterwort, with pink and white flowers, is a showy border perennial. The Australasian genus *Trachymene* contributes a single annual species, *T. cærulea*, with bright blue flowers. The genus *Ferula* is sometimes represented in beds bordering lawns by single specimens of *F. communis*, the Giant Fennel, whose finely divided foliage forms dense tufts, 3 or 4 feet high and wide, from which rise the flower-stems 3 feet higher. *F. tingitana* and *F. glauca* are also cultivated like *F. communis* as foliage plants. The genus *Heracleum*, represented on our roadside wastes and hedge-banks by the Hogweed (*H. sphondylium*), includes several noble species that have been introduced to our shrubberies and wild-gardens from abroad. The most frequently seen is *H. villosum*, or, as it is more generally but less correctly named, *H. giganteum.* It grows to a height of 10 or 12 feet, but is quite out of place in a small garden, or indeed any place where it has not plenty of room to show itself. It is a native of the Caucasus.

A few other genera are occasionally represented in gardens, but on the whole the Order has very little interest for the gardener, though it has much for the botanist.

EPIPHYLLUM TRUNCATUM

$^{2}/_{3}$ Nat. size

PL. 118

FATSIAS

Natural Order ARALIACEÆ. Genus *Fatsia*

FATSIA (the Japanese name). A small genus comprising only three species of shrubs with large, handsome, palmately-lobed leaves, and small greenish flowers arranged in umbels. Petals five, stamens five, stigmas five. The flowers are very similar to those of the Order UMBELLIFERÆ. The species are confined to North-West America, Japan, and Formosa.

History. The *Fatsias* are of recent introduction to British gardens, *F. horrida*, from North-West America, making its appearance only in 1829 and *F. papyrifera* in 1852. The last named is rather tender in this country, and used chiefly in what is called sub-tropical gardening, but in its native country it has something more than horticultural value. It is the plant from which the Rice-paper is made. It is said to attain its full size in less than a year, when the stems are cut down and left to soak in running water for several days to loosen the bark. Then the cylindrical mass of pith is removed, cut into lengths, and revolved against the edge of a sharp knife, which cuts it into a thin even sheet.

Species. FATSIA HORRIDA (rugged, in allusion to its spines and prickles). Stems 6 to 12 feet high, armed with yellow spines. Leaves palmately-lobed, the general outline being heart-shaped; prickly. Flowers in terminal panicles of umbels; August.

F. JAPONICA (Japanese). Stem erect, 3 to 5 feet. Leaves large and leathery; digitately lobed. Flowers small, in umbellate panicles; July and August. There is a var. *variegata* with white margins and blotches; var. *reticulata* has golden-yellow veins, and var. *variegata-aurea* has markings of a rich yellow hue. Also known as *Aralia Sieboldii.*

F. PAPYRIFERA (paper-bearing). Rice-paper Plant. Stem erect, branching above, 6 to 8 feet high. Leaves large, five- or seven-lobed. Flowers in drooping panicles; July and August. Young plant downy, afterwards smooth.

Culture. Fatsias are chiefly grown in pots for greenhouse or indoor decoration; sometimes turned out in the beds in summer. They succeed best in a compost of which sandy loam forms the base, and to which is added peat, leaf-mould, and sand. They require plenty of water, but free drainage must be provided. Propagation is effected by cuttings either of the root or stem, pieces about two inches long being inserted in pots of sandy soil and placed in bottom heat, when

they root freely. *F. japonica* is easily raised from seeds sown in gentle heat. In the South of England it thrives out of doors in sheltered positions. There is a fine mass of it in the arboretum at Kew. It is largely grown as a window-plant.

Description of Plate 121. Upper portion of a plant of *Fatsia japonica* showing leaves and flowers. Fig. 1 shows a flower enlarged; 2, a section through same; and 3, a fruit.

ARALIAS

Natural Order ARALIACEÆ. Genus *Aralia*

ARALIA (derivation unknown). A genus of about thirty species of perennial herbs or shrubs, very similar to *Fatsia*, which was formerly included here. The leaves are digitately lobed or pinnate. Flowers very like those of *Fatsia*, though the petals are differently arranged. The species are grown for the handsome foliage, not for the flowers. They are natives of North America, New Zealand, and Asia.

Species. ARALIA CHABRIERII (Chabrier's). Stem erect. Leaves alternate, a foot long, pinnate, the leaflets narrow-lance-shaped, midrib crimson. Stove. Introduced 1882. The correct name of this plant is *Elæodendron orientale*. It is not even an Araliad.

A. CHINENSIS (Chinese). Stem erect, 5 to 20 feet high, branched, forming a tree in the South of England. Leaves leathery, pinnate, leaflets oval with toothed apex. Flowers white. Hardy where sub-soil is very porous. Introduced from China (1838). Syn. *Dimorphœnthus mandschuricus*.

A. ELEGANTISSIMA (most elegant). Stem erect. Leaves digitate; leaflets exceedingly slender, pendulous; leaf-stalk mottled with white. Stove. Introduced from South Sea Islands (1873).

A. RICINIFOLIA is a handsome hardy shrub with leaves not unlike those of the Castor-oil Plant, and with spinous stems. It is a native of China and Japan. Botanists now call it an *Acanthopanax*.

A. SPINOSA (prickly). Stem unbranched, 8 to 12 feet high, prickly. Leaves twice or thrice pinnate; leaflets oval, deeply toothed. Flowers white. Introduced from North America (1688), where it is known as Angelica-tree. Hardy in sheltered situations.

A. VEITCHII (Veitch's). Stem erect, slender. Leaves digitate, with ten or eleven long and very slender, undulated leaflets, on long slender footstalks. Introduced from New Caledonia (1867).

OPUNTIA VULGARIS

Nat. size

PL. 119

Cultivation. The tropical species of Aralia require a hot moist house and rich well-drained soil. They are propagated by means of cuttings, but *A. Veitchii* and a few similar species can only be multiplied by means of grafting. The hardy species thrive in sunny positions in light soils, and are propagated in the same manner as *Fatsias*.

IVIES

Natural Order ARALIACEÆ. Genus *Hedera*

HEDERA (the old Latin name for the plant). An important genus of climbing shrubs, though it includes but two species. They have alternate leaves and flowers in panicled umbels. The calyx has an entire or five-toothed limb; petals five, soon falling; stamens five; ovary five-celled. The Common Ivy is distributed over the temperate regions of the Old World; the other species is a native of Queensland.

Species. HEDERA AUSTRALIANA (Australian). Leaves pinnate, with a few more or less oval leaflets, smooth and shining, as much as 6 inches long.

H. HELIX (a Latin name for creeping Ivy, from the Greek word (*'elix*) for anything coiled or twining). Common Ivy. Stems trailing and flowerless, or arboreous and flowering, old specimens forming trunks 6 to 10 inches in diameter. Leaves leathery, heart-shaped at base, variably lobed and differing in width, those of the flowering branches lance-shaped. Flowers yellowish green; September to November. There are an enormous number of varieties recorded, their differences chiefly consisting in some slight departure from the typical form in the colour and size of the leaf or the shape of the lobes.

Culture. Ivies will grow almost anywhere in these islands, in sunshine or shade. A more luxuriant growth can be obtained by enriching the soil, but they do fairly well in all but the poorest and driest of earth. They are readily propagated by cuttings from pieces of stem a foot long, planted in a sunny border in autumn. The tree form is not so easily rooted as the climbing form. Choice varieties are sometimes grafted. Where a number of vigorous plants are wanted to cover some new or unsightly object quickly, the cuttings should be struck in a little heat. They will make much more rapid growth when planted out.

HONEYSUCKLES

Natural Order CAPRIFOLIACEÆ. Genus *Lonicera*

LONICERA (named by Linnæus in honour of Adam Lonicer, a German botanist, 1528–1586). A genus of erect or twining shrubs, including about eighty species. They have simple, opposite leaves. Calyx-tube oval, or nearly globular, with five teeth. Corolla tubular, bell-shaped or funnel-shaped, with irregular limb, obliquely cut or two-lipped. Stamens five. Natives of the Temperate and warmer regions of the Northern Hemisphere.

Principal Species.

LONICERA CAPRIFOLIUM (Goat-leaf). Perfoliate Honeysuckle. Stems twining. Leaves broadly oval or oblong, the upper pairs joined by their bases. Flowers dull red without, yellow within; May and June. Native of Europe, naturalised locally in England.

L. FLEXUOSA (flexuous). Japanese Honeysuckle. Stems twining. Leaves oval-oblong, some entire, others lobed like an oak-leaf; opposite. Flowers small, pale yellow, in pairs, fragrant; June and July. Native of Japan (1806). There is a var. *Aurea reticulata*, whose leaves are netted or blotched with yellow.

L. FRAGRANTISSIMA (most fragrant). Stems erect, 6 feet high. Leaves oblong. Flowers white, tube short, but mouth nearly an inch across; fragrant; February. Native of China (1845).

L. PERICLYMENUM. Woodbine. Stems twining, 10 to 20 feet. Leaves oval; upper stalkless. Flowers in terminal heads; red without, yellow within; fragrant; June to September. Native.

L. SEMPERVIRENS (evergreen). Stems twining, 15 feet high. Leaves ovate; upper pairs joined by their bases. Flowers scarlet without, yellow within; in terminal whorled spikes; May to August. Introduced from North America (1656).

Cultivation.

Loniceras succeed in any good garden soil. The climbing species should be planted against a trellis, porch, or arbour. Most of the species produce their flowers on the newly-formed shoots, and may therefore be cut back freely in autumn, but *L. fragrantissima* and *L. Standishii* flower early in the year on the old wood. These must not be pruned until after flowering. *L. sempervirens* is best grown in a cool house, where it may be trained up pillars. Propagation is chiefly effected by cuttings or layers.

FIG MARIGOLDS

(*A*) MESEMBRYANTHEMUM VIOLACEUM

(*B*) M. ECHINATUM (*C*) M. CYMBIFOLIUM

Nat. size

PL. 120

DIERVILLAS

Natural Order CAPRIFOLIACEÆ. Genus *Diervilla*

DIERVILLA (named by Tournefort in honour of M. Dierville, a French surgeon and traveller, who sent home the first species, 1739). A genus of hardy ornamental shrubs with opposite leaves, and funnel-shaped or bell-shaped tubular flowers in showy clusters. Stamens five; style slender. The species are natives of North America and Asia. Some are better known in gardens under the synonym of *Weigela*.

Principal Species. DIERVILLA GRANDIFLORA (large-flowered). Stems branched, 8 feet high. Leaves oval-lance-shaped, toothed, strongly veined beneath. Flowers pink; May and June. Native of Japan. Several varieties are known in gardens.

D. ROSEA (rosy). Similar to the last, but of smaller stature (6 feet) and foliage. The leaves lack the prominence of the net-veining beneath, and the rosy or white flowers are produced in greater abundance. Introduced from China (1844). There are several varieties of this species also.

Cultivation. *Diervillas* succeed out of doors in ordinary garden soil, provided they have a fair amount of moisture, and the aspect is not very sunny. They may be propagated by separating the suckers, or by means of cuttings taken in autumn or spring.

GUELDER ROSE AND LAURESTINE

Natural Order CAPRIFOLIACEÆ. GENUS *Viburnum*

VIBURNUM (the classical Latin name). A genus with about eighty species of trees and shrubs, having leaves toothed, usually opposite, occasionally in threes; and white or pinkish flowers. The structure of the flowers is similar to that of *Diervilla*, but the inflorescence is a large corymb or panicle, the outer flowers often large and sterile. They are natives of the temperate and warm regions of the Northern Hemisphere, extending south to the Andes, and occurring rarely in the West Indies and Madagascar. Two species are natives of Britain—*V. Opulus* and *V. Lantana*.

Principal Species. VIBURNUM DILATATUM (extended). Stems 10 feet high. Leaves almost round, coarsely toothed, slightly hairy. Flowers white, in cymes; June. Introduced from Japan (1845).

V. MACROCEPHALUM (large-headed). Stems 20 feet high. Leaves oval, toothed, somewhat rough, covered beneath with scurfy down. Flowers in compound cymes, somewhat pyramidal in form, the outer flowers sterile; June. Introduced from China (1844). The *V. Fortunei* of gardens.

V. PLICATUM (plaited). A sturdy shrub with rough dark green ovate leaves, and compact heads of pure white flowers. One of the best of shrubs for gardens in the South of England. A native of China.

V. OPULUS (rich). Guelder Rose. Stem branched, 6 to 8 feet. Leaves three-lobed, toothed, downy when young. Flowers in roundish cymes, 3 or 4 inches across; inner flowers creamy, $\frac{1}{4}$-inch across; outer white, $\frac{3}{4}$-inch; June and July. The var. *sterilis* is the Snowball-tree of gardens; the cyme more globular and *all* the flowers sterile.

V. TINUS (the Latin name). Laurustinus, or Laurestine. Stems branched, 8 to 10 feet. Leaves oval-oblong, margins entire; veining beneath marked out by glandular hairs; evergreen. Flowers in flat corymbs; rosy at time of opening, but soon becoming white; December to March. Introduced from Southern Europe three hundred years ago. There are several garden varieties.

Cultivation. *Viburnums* exhibit no particular preference in the matter of soils; therefore may be introduced into almost any garden where desired. Propagation is also a simple process. Cuttings should be made from the half-ripened wood, and inserted in sandy soil in a shady place. They should also be covered with a *cloche*, or hand-light, until rooted. The lower shoots may be layered.

BOUVARDIAS

Natural Order RUBIACEÆ. Genus *Bouvardia*

BOUVARDIA (named by Salisbury in honour of Dr. Chas. Bouvard, a former Superintendent of the Jardin du Roi, Paris). A genus of evergreen greenhouse shrubs, comprising about twenty-six species, mostly natives of Mexico, with handsome flowers in terminal corymbs, and opposite or whorled leaves. The calyx is tubular, with four awl-shaped lobes. The corolla is tubular, elongated and funnel-shaped, with a four-parted spreading limb. Stamens attached to the corolla-tube; stigma divided into two plates at its extremity.

JAPANESE ARALIA

(FATSIA JAPONICA)

= 1/4 Nat. size

PL. 121

History. *Bouvardias* are of comparatively recent adoption as greenhouse flowers, the first known species—*B. triphylla*—having been introduced from Mexico just over a hundred years ago. For twenty years it remained the sole representative of the genus in this country; then it was followed by *B. versicolor* from South America, and thirteen years later (1827) by *B. longiflora*, the subject of our Plate. *B. angustifolia* was introduced in 1838, *B. flava* in 1845, *B. Cavanillesii* a year later, *B. leiantha* in 1850, *B. jasminiflora* in 1869, and *B. Humboldtii* in 1874. With the exception of *B. jasminiflora*, which is South American, all these species came from Mexico. They have been much cultivated and crossed, with the result that there are a number of hybrids, some of which are more in request than the original species.

Principal Species. BOUVARDIA ANGUSTIFOLIA (narrow-leaved). Stems round, 2 feet high. Leaves lance-shaped, with edges turned back and fine hairs beneath; in whorls of three. Flowers pale red; September.

B. FLAVA (yellow). Stems about 18 inches high. Leaves oval-lance-shaped, fringed with fine hairs; opposite. Flowers drooping, yellow, three to five in a raceme; March.

B. HUMBOLDTII (Humboldt's). Leaves oblong. Flowers large, white and fragrant; tube long; in terminal racemes; September to February.

B. JASMINIFLORA (Jasmine-flowered). Leaves elliptic, opposite. Flowers white, fragrant, numerous, in compound cymes; November to February.

B. LONGIFLORA (long-flowered). Stems squarish, smooth, 2 to 3 feet high. Leaves oblong, smooth, opposite. Flowers white, with long tubes, fragrant; stalkless; autumn. Plate 122.

B. TRIPHYLLA (three-leaved). Stems 2 to 3 feet high, with three-sided, hairy branches. Leaves oblong, three in a whorl, hairy beneath. Flowers scarlet, nearly an inch long; July.

GARDEN HYBRIDS.

SINGLE-FLOWERED.

Bockii, tube white, limb coral-red.
Brilliant, bright crimson.
Dazzler, large, rich scarlet, bushy.
Flavescens, pale yellow.
Hogarth, scarlet.
Laura, fine rose.
Longiflora flammea, blush-rose.
Maiden's Blush, blush-rose.
Mrs. Green, salmon-colour.
President Cleveland, crimson-scarlet.
Priory Beauty, pale rose.
Queen of Roses, dwarf, rosy pink.
Rosea multiflora, large, rosy pink.
Rosea oculata, flesh.
Scarlet Prince, bright scarlet.
The Bride, white.
Vreelandii, white, abundant.
Vulcan, rich scarlet.
White Bouquet, dwarf, white.

DOUBLE-FLOWERED.

Alfred Neuner, white, profuse bloomer.
Flavescens flore pleno, lemon-yellow, changing to cream.
Hogarth flore pleno, large, scarlet-carmine.
President Garfield, pink, in large trusses.

Cultivation. *Bouvardias* are very valuable plants where cut flowers are in request. Their culture is by no means difficult, and they do not need the high temperature that is commonly given to them. They may be placed out of doors in summer and treated after the manner of a pot Chrysanthemum, or even planted out in a frame or on a spent hot-bed, plunging the pots up to the rim in ashes or in the spent hot-bed (taking care that drainage is perfect), giving plenty of water, and mulching the tops to protect the roots. The shoots should be pinched back, and when the pots are well filled with roots liquid manure should be given. In potting a liberal quantity of crocks should be allowed, as efficient drainage is of the utmost importance; and the compost should consist of equal quantities of fibrous loam, sand, and leaf-mould, with the addition of a little peat.

Stopping the shoots should not be practised later than the end of August. As soon as the weather begins to turn cold they should be removed to the greenhouse, where they will do well through the winter in a temperature between 50° and 60°. They are propagated by means of cuttings taken from the new shoots, not necessarily at a joint, for they readily root from any part. The compost mentioned above, covered with a good layer of sand, should be used, the cuttings inserted rather closely in the pots, covered with a bell-glass, and placed in bottom heat. They require a close moist temperature of about 75°, and in this they will be rooted in about three weeks.

Description of Plate 122. A flowering shoot of *Bouvardia longiflora*. Fig. 1, a flower removed; Fig. 2, a section of the same.

IXORAS

Natural Order Rubiaceæ. Genus *Ixora*

Ixora (from *Iswarra*, the name of an Indian deity, to whose idol the flowers are offered). A genus of about one hundred species of stove evergreens, mostly with opposite leaves and salver-shaped tubular flowers in terminal corymbs; scarlet, pink, or white, and frequently fragrant. The four or five anthers are inserted in the throat of the corolla-tube, and the succulent fruit is inferior to the calyx. The species are found chiefly in the tropical regions of Asia and Africa; a few others being natives of America, Australia, and the Pacific Islands. *I. coccinea* is used medicinally in India.

BOUVARDIA LONGIFLORA

Nat. size

PL. 122

Principal Species.

Ixora chelsoni (Chelsea). Stems branching, dwarf. Flowers profuse, bright orange-salmon, in large, dense, rounded corymbs; June to September. A garden hybrid.

I. coccinea (scarlet). Stems 3 to 4 feet high. Leaves heart-shaped, shining. Flowers bright scarlet, 2 inches long, in umbellate corymbs; June to September. Introduced from East Indies (1814).

I. Colei (Cole's). A handsome and robust garden hybrid, the progeny of *I. coccinea* and *I. stricta*. Leaves roundish. Flowers pure white, in large corymbs.

I. concinna (neat). A garden hybrid with large corymbs of bright salmon-coloured flowers, which afterwards become more pinkish. First produced in 1882.

I. Fraseri (Fraser's). A garden variety with brilliant salmon-coloured flowers, the corolla-tubes carmine-scarlet; in numerous large globular corymbs.

I. fulgens (glittering). Stems 3 to 4 feet high. Leaves slender-lance-shaped. Flowers orange-scarlet, in dense terminal corymbs; June to August. Introduced from the East Indies (1823).

I. javanica (Javan). Stems 3 to 4 feet high. Leaves oval-oblong. Flowers orange, in dense corymbs; June to September. Introduced from Java (1846).

I. macrothyrsa (large thyrsus). A fine plant with broad leaves as much as 10 inches long, and immense corymbs of deep-red flowers. Introduced from South Sea Islands (1878).

I. Pilgrimii (Pilgrim's). A fine garden hybrid, owning *I. Williamsi* (a garden variety) as parent, produced in 1880. The flowers are bright orange-scarlet tinged with crimson, and clustered in dense round corymbs, 7 inches across.

I. princeps (foremost). A natural species from Java, with lance-shaped leaves 6 or 7 inches long, and flowers which are at first buff-white but afterwards deep reddish orange.

I. regina (queen). A garden variety with oval leaves and large corymbs of violet-salmon flowers.

I. splendens (splendid). A garden variety with bluntly elliptic leaves and brilliant coppery-scarlet flowers in very large corymbs.

I. Williamsi (Williams'). A garden variety with large corymbs of reddish-salmon flowers.

Cultivation.

Ixoras all require stove treatment, and it is almost impossible to give them too high a temperature or too humid an atmosphere during the summer. *I. Pilgrimi* will succeed in a much lower temperature than the others; and for all the house should

be kept both cooler and drier during the winter, otherwise they will not sufficiently ripen their wood. The most suitable soil is a compost of fibrous peat and leaf-mould, with a plentiful addition of silver sand. Although abundance of light is necessary for their successful growth, they must be protected from the direct rays of the sun in summer. Propagation is effected by means of short cuttings, inserted singly in pots of the compost named, and plunged in bottom heat, in a close and shaded frame; transferred to five-inch pots when rooted, and placed in the stove with a high temperature and kept moist.

CROSSWORTS

Natural Order RUBIACEÆ. Genus *Asperula*

ASPERULA (from Latin, *asper*, rough). A genus of about fifty species of herbs or small shrubs, with four-angled stems. The leaves and leaf-like stipules together form a regular whorl at the joints of the stem. The flowers are small, honey-bearing, grouped in cymes. The calyx is four-toothed; the corolla funnel-shaped or bell-shaped, the limb cut into four segments. Stamens four; styles two, more or less joined. The species are natives of the temperate regions of the earth; two British.

History. Our native *Asperula odorata*, the Woodruff, was doubtless an inmate of British gardens at a very early period, for in addition to its fresh and neat appearance, our fore-mothers valued it on account of the sweet odour it gives out when drying, and which imparted its savour to the clean linen in the "press." *A. cynanchica*, no doubt, found its place in the olitory, or herb-garden, for it had a good reputation as a specific in quinsy. Of the exotic species, *A. arvensis*, from Europe, was the first to be introduced (1596). It is an annual species with pink flowers, that got itself naturalised here until the early part of this century; it is still occasionally found in cornfields. *A. galioides* and *A. taurina* (South European plants) were introduced in 1710 and 1739 respectively, *A. tinctoria* in 1764, *A. lævigata* in 1775. *A. montana*, with pink flowers, came from Hungary in 1801, and *A. longiflora* from the same region twenty years later. The blue-flowered *A. orientalis* is a native of the Caucasus, whence it was introduced 1867.

Principal Species. ASPERULA LONGIFLORA (long-flowered). Stems slender, numerous, more or less erect, smooth, 6 inches. Leaves

CROSSWORTS

(*A*) ASPERULA ORIENTALIS (*B*) PHUOPSIS STYLOSA

Nat. size

narrow, in fours. Flowers with long tubes, reddish without, yellowish within; cymes terminal; May to July.

A. MONTANA (mountain). Stems weak, smooth, 6 to 8 inches high. Leaves narrow, four or six in a whorl; upper ones opposite. Flowers pink; June and July.

A. ODORATA (fragrant). Stems four-angled, erect, 6 to 12 inches high. Leaves lance-shaped, smooth, with rough-toothed edges, eight in a whorl. Flowers small, pure white; May and June.

A. ORIENTALIS (Eastern). Stems branched, 12 inches high. Leaves lance-shaped, bristly, eight in a whorl. Flowers blue, terminal; June and July. Annual.

Culture. *Asperulas* will succeed in any ordinary garden soils, and are suitable as edgings to borders, or to form tufts for the rock-garden. A shady position is best for them, and they do well under trees. They are propagated by division of the creeping rhizomes.

The neighbouring genus *Phuopsis* contains a single species,—*P. stylosa* (large-styled),—which is cultivated like the *Asperulas.* It has stems about 1 foot high, with lance-shaped leaves, six or eight in a whorl; pink or purple corollas with *five* lobes and a style almost as long again as the tube; July. It is a native of the Caucasus, whence it was introduced 1836.

Description of Plate 123. A, *Asperula orientalis* with leaves and flowers. Fig. 1 is a detached flower enlarged; 2, a section through the same; 3, a seed, natural size and magnified; 4, a seedling.

B, *Phuopsis stylosa.* Fig. 5, an unopened flower; 6, an open one; 7, section.

GARDENIAS

Natural Order RUBIACEÆ. Genus *Gardenia*

GARDENIA (named in honour of Dr. Alexander Garden of Charleston Carolina, a correspondent of Linnæus'). A genus including about sixty species of stove and greenhouse evergreen shrubs, with (usually) opposite leaves and tubular (funnel-shaped or salver-shaped) white flowers. The corolla-limb is divided into from five to nine segments, the stamens agreeing in number with them. They are natives of Tropical Asia and South Africa.

Principal Species. GARDENIA FLORIDA (flowery). Cape Jessamine. Stem shrubby, erect, 2 to 6 feet high. Leaves elliptic. Flowers

white, fragrant, solitary; corolla nine-parted; August. Introduced from China (1754). The var. *Fortunei* is a larger form. Stove.

G. NITIDA (shining). Stem 3 feet high. Leaves oblong-lance-shaped, undulated; opposite, or three in a whorl. Flowers white, solitary; corolla seven-parted; October and November. Introduced from Sierra Leone (1844). Stove.

G. THUNBERGIA (Thunberg's). Stem 4 to 5 eet high. Leaves elliptic, smooth, opposite or whorled. Flowers large, white, fragrant, solitary; corolla eight-parted; January to March. Introduced from South Africa (1773). Greenhouse.

Cultivation. For the decoration of the greenhouse or stove *Gardenias* have much to recommend them, whilst for the supply of cut-flowers they are invaluable. The great point in growing is to see that the plants do not get old. Cuttings should be struck every year, and after two or three seasons' flowering the plants should be thrown away. Propagation should be effected preferably in January, the cuttings taken with a heel from the partly-ripened side-shoots and inserted in small pots of peat and sand. They require to be plunged in a bottom heat of 75° and kept close. When rooted they must be gradually used to lower temperatures, and potted in a compost of two parts peat to one of fibrous loam with which a little charcoal has been worked in. Shift on when necessary, and when growth is completed for the season, harden off by exposure to a lower temperature in more airy structures. Give water abundantly during the growing period, and syringe twice a day. The plants may be started in a hot moist house in April and gradually hardened as the flower buds develop. They are beautiful shrubs for the conservatory when well grown and flowered. *G. Thunbergia* does not flower in gardens in this country, but at the Cape and in similarly dry sunny climes it is a beautiful free-flowering shrub. *Gardenias* are very liable to the attacks of Mealy-bug, Red-spider, Green-fly, and Scale-insect, which must be constantly looked for.

SPUR VALERIANS

Natural Order VALERIANEÆ. Genus *Centranthus*

CENTRANTHUS (from Greek, *kentron*, a spur, and *anthos*, a flower). A genus of about ten species of perennial, rarely annual, herbs, mostly with entire, opposite leaves and small red or white flowers in panicled

LARGE SPUR VALERIAN

(CENTRANTHUS MACROSIPHON)

$^{2}/_{3}$ Nat. size

PL. 124

corymbs. The structure of these flowers is peculiar. Before the corolla falls, the calyx is represented by a mere thickened margin to the ovary, but as the fruit matures this unrolls and discovers it as a whorl of feathery appendages. The corolla is tubular with a five-lobed spreading limb—one lobe standing out by itself. The tube is continued past its attachment to the ovary as a hollow spur containing honey. There is but one stamen, and the fruit is one-seeded. The species are natives of Europe, North Africa, and Western Asia.

History. Spur Valerians have been known in British gardens throughout a very long period. At what date *C. ruber*, the Red Valerian, was introduced is not known, but it has long been naturalised in the South of England and in Ireland. Its favourite habitat is on old walls, where it has a very fine appearance. In Southern Italy it is said to be eaten as a salad, and possibly it may have owed its introduction here to that fact, or to the sweet-scented roots being used in medicine, as are those of the Cats' Valerian (*Valeriana officinalis*). *C. calcitrapa* was introduced from Portugal in 1683 and *C. angustifolius* from Southern Europe in 1759.

Principal Species. CENTRANTHUS CALCITRAPA (Caltrops-like). Stems 6 to 12 inches high. Lower leaves oval, entire or lobed; upper ones lobed in a pinnate manner. Flowers white with a reddish tinge; May to July. Annual.

C. MACROSIPHON (large-tubed). Large Spur Valerian. Stems hollow, 2 feet. Leaves broad-oval, entire or lobed pinnately, glaucous. Flowers rosy, in very large corymbs; July. Annual. Native of Spain. There is a var. *alba*.

C. RUBER (red). Red Valerian. Stem with woody base and erect branches, 2 to 3 feet high, hollow. Leaves leathery, oval or lance-shaped, lower stalked, upper stalkless, entire, or toothed at the base. Flowers red, smaller than those of *C. macrosiphon*, spur slender; in somewhat pyramidal panicles composed of dense cymes; June to September. There are several varieties, including *albus* with white flowers.

Cultivation. The species of *Centranthus* are readily propagated by seed sown in March outside, or in the case of the perennial kinds by division of the tufts. They are not particular as to soil, but they like a dry situation. They make handsome clumps in a sunny border or on the higher parts of the rock-garden. *C. ruber* is a grand plant when grown on chalky soil. It is not nearly as largely cultivated as it deserves. On sloping banks facing south it makes a brilliant picture in the early summer.

Description of Plate 124. The upper portion of a stem of *Centranthus macrosiphon* with leaves and flowers. Figs. 1 and 2 are enlarged flowers; 3, a section; 4, the fruit and calyx, natural size and enlarged; 5, a seedling.

SCABIOUS

Natural Order DIPSACEÆ. Genus *Scabiosa*

SCABIOSA (Latin, *scabies*, the itch; formerly used as a medicine in skin diseases). A genus consisting of about eighty species of perennial herbs with entire or pinnately-lobed leaves, and small tubular flowers massed in half-round or flattened heads with an involucre of leafy bracts. The individual flowers are invested by a tubular involucel with four or eight angles, or four or five lobes. The calyx is bristly, the limb cup-shaped, with four to sixteen rigid bristles or teeth. Corolla oblique or two-lipped, honeyed, with four or five lobes. Stamens four; stigma notched. They are natives of Europe, Africa, and Western Asia.

History. There are three British species of Scabious, but these are rarely, if ever, seen in gardens, though it is probable they were, or at least that one of them was, cultivated prior to the introduction of *Scabiosa stellata* from Spain in 1596, and *S. graminifolia* in 1597. *S. atropurpurea*, the Sweet Scabious, also known as the Mournful Widow, was introduced from Southern Europe in 1629, and is a popular garden plant with us to-day. In Portugal, as well as in Brazil, the flowers of this species are much used in the construction of funeral wreaths. *S. graminifolia* was introduced from Switzerland in 1683, but *S. caucasica* was not known in our gardens until 1803, when it was brought from the Caucasus; and *S. webbiana*, another garden plant, came from Phrygia in 1818. Several others are of more recent introduction still, but the above are those of chief horticultural merit, and all hardy.

Principal Species. SCABIOSA ATROPURPUREA (dark purple). Stems branched, 2 to 3 feet. Radical leaves lyre-shaped, toothed; stem-leaves pinnately lobed, the lobes toothed or cut. Flower-heads deep crimson; July to September. There are numerous varieties, with flowers white, flesh, rosy, or purple, and a *flore pleno* with all the florets large like the outer series in the typical flower of the species. There is also a dwarf form (var. *nana*), and a var. *folis aureis* with yellow leaves.

S. CAUCASICA (Caucasian). Stems 1 foot high. Radical leaves

CAUCASIAN SCABIOUS
(SCABIOSA CAUCASICA)

Nat. size

PL. 125

lance-shaped, glaucous; stem-leaves pinnately lobed, the segments very slender. Flower-heads 3 inches across, pale blue; involucre hairy, corollas five-parted; June to August. The var. *elegans* has whitish leaves, the upper ones undivided like the lower.

S. WEBBIANA (Webb's). Stems 6 inches high. Leaves: lower ones stalked, oval with rounded teeth; upper with oval or oblong lobes arranged pinnately. Leaves and stems softly woolly. Flower-heads creamy yellow, on long stalks; July.

Cultivation. Ordinary well-dug garden soils suffice for *Scabiosa*. The species described are quite hardy, and are grown without difficulty from seed sown in March or April. Occasionally the clumps may be divided, but we think it is preferable to keep them full-sized, and to propagate entirely by seeds.

Description of Plate 125. Leaves and flowers of *Scabiosa caucasica*, natural size. Fig. 1 is a flower separated from the outside of the head with the corolla-lobes irregular (*radiant*); Fig. 2 is a flower from the centre (*disk*); Fig. 3 is a section of 2. It should be noted as a ready means of distinguishing between the Orders DIPSACEÆ and COMPOSITÆ, which follows, that in the first the anthers are free, whilst in COMPOSITÆ their bases are attached and they are usually joined together.

The Wild Teasel (*Dipsacus sylvestris*), which belongs to this Order, may be grown in the wild-garden if there is plenty of room to show off a clump of its tall, straight stems with bluish flower-heads and striking leaves.

AGERATUMS

Natural Order COMPOSITÆ. Genus *Ageratum*

AGERATUM (Greek, *a*, not, and *geras*, old age; from the absence of the white pappus usual in Composite fruits). A small genus (about sixteen species) of herbs and shrubs with opposite leaves and composite flower-heads, enclosed in a cup-shaped involucre formed of the floral bracts. The species are mostly natives of the hotter parts of America, but one species is of wide distribution in the warmer regions of the globe.

History. There is some confusion in the records of the introduction of *Ageratums* to this country, owing to the fact that one species is described under several names. According to Loudon, *A. conyzoides* was the first arrival from America, in 1714; *A. cæruleum* from the West Indies in 1800, and *A. mexicanum* from

Mexico in 1822. These now appear to be synonyms for one species which we call *A. cæruleum*, and which is the only species widely grown in gardens. *A. Wendlandi* was introduced from Mexico only in 1885.

Species. AGERATUM CÆRULEUM (sky-blue). Stem branched, 2 feet high. Leaves oval, saw-toothed, stalked. Flowers lilac-blue, in small hemispherical heads, densely clustered; June and July. There are several varieties in cultivation, of which the best are:—

Cupid, dwarf, rich blue; *Queen*, dwarf, silvery grey; *Snowflake*, white; *Swanley Blue*, dwarf, deep blue; *Tapis Blanc*, dwarf and compact, white.

A. WENDLANDI (Wendland's). Stems hairy, 5 or 6 inches high. Leaves heart-shaped. Flower-heads purplish blue.

Cultivation. Though *Ageratums* will succeed in any garden soil, to get the best results from them they should be grown in a rich light compost. They are propagated by cuttings and seeds. The seeds are sown in January in pans of sandy soil and germinated in heat, the seedlings being pricked into "thumbs" as soon as possible, and kept in heat for a time. When they are making good growth they should be gradually accustomed to lower temperatures, and potted on if intended for greenhouse flowering. If required for bedding, they should be kept in small pots until planted out in the latter half of June. They may also be sown in a warm sunny border in April or May. The varieties must be propagated by cuttings from the old plants that have been kept in the greenhouse through the winter. The new shoots should be taken about May from the ripened stems and struck in heat; then hardened off and planted out. The taller forms may be pegged down after the fashion adopted for *Verbenas*.

Description of Plate 126. The upper part of a plant of *Ageratum cæruleum*. Fig. 1 is an enlarged section of a flower-head; 2 is a separated floret enlarged; 3, a section through same; 4, the fruit, natural size and enlarged; and 5, a seedling.

GOLDEN RODS

Natural Order COMPOSITÆ. Genus *Solidago*

SOLIDAGO (Latin, *solido*, to consolidate or make whole; from its supposed healing virtues). A genus comprising about eighty species of perennial herbs, sometimes with shrubby base. The leaves are alternate, entire or toothed Flower-heads usually yellow, the outer series of florets

AGERATUM CŒRULEUM

Nat. size

PL. 126

rayed; small but numerous, arranged in scorpioid cymes. The ray-florets are female or neuter; the central or disk-florets are tubular, five-lobed, and bisexual. Pappus-hairs rough in one or two series. The species are natives of the Arctic and North Temperate regions, though most of them are confined to North America. One species is British.

History. Like many other genera that comprise native species of an ornamental character there is every probability that such native species have been cultivated from the early days of gardening; especially when, as in the present instance, the plant had reputation as a herb of healing. The species referred to is *Solidago Virgaurea*, a plant growing wild in our woods and thickets. *S. canadensis* was the first of the North American species to be introduced (1648). *S. mexicana* followed in 1683, and was quickly succeeded (1686) by *S. rugosa* under the name of *altissima*. *S. odora*, *S. sempervirens*, and *S. lævigata* all made their appearance here in 1699. *S. lanceolata* dates from 1758, *S. speciosa* from 1817, and *S. Drummondii* only from 1885. Many others have been introduced and have had a trial in the garden, but very few species are now grown except in cottage-gardens and shrubberies. This is due to their rather coarse habit and the fact that they spread too quickly and impoverish the soil.

Species. SOLIDAGO CANADENSIS (Canadian). Stems covered with rough hairs, 3 to 6 feet high. Leaves lance-shaped, sharply toothed, rough above, downy below. Flower-heads with short rays, crowded in large panicles; August. Plate 127.

S. DRUMMONDII (Drummond's). Stems downy, 1 to 3 feet high. Leaves oval, coarsely toothed, velvety beneath. Flower-heads small, rays short; cymes short, panicled; July and August.

S. LANCEOLATA (lance-shaped). Stems 2 to 3 feet high; upper part downy. Leaves slender-lance-shaped, not toothed, rough above. Flower-heads in dense corymbose clusters; September.

S. SPECIOSA (showy). Stems stout, smooth, 3 to 6 feet high. Leaves oval, thick and rough, slightly toothed; upper ones lance-shaped. Flower-heads large, the crowded, erect cymes forming a somewhat pyramidal large panicle; October.

S. VIRGAUREA (gold rod). Stems erect, 4 inches to 2 feet, downy with curled hairs, or smooth. Leaves slender or lance-shaped, faintly toothed. Flower-heads crowded; July to September.

Cultivation. *Solidagos* succeed in any soil, and should only be grown where there is plenty of room, so that they may be out of the way of small plants. They are useful for massing in rough ground, or in the front row of a shrubbery. If planted in the border they

must be kept within bounds by annually lifting the clumps and reducing them. They are most useful for covering unsightly places in the garden. Propagation is easily effected by dividing the clumps. All the species are hardy.

Description of Plate 127. The upper portion of *Solidago canadensis* is shown. Fig. 1 is an enlarged view of a separate flower-head; 2, a section through same; 3, a single disk-floret surrounded by the pappus-hairs; 4, a ray-floret.

SWAN RIVER DAISIES

Natural Order Compositæ. Genus *Brachycome*

Brachycome (Greek, *brachys*, short, and *kome*, hair, alluding to the shortness of the pappus-hairs). A genus comprising about thirty species of annuals and perennials, very similar to *Bellis* (the Common Daisy) in structure. *Bellis*, however, has no pappus, whilst *Brachycome* has. Another point in which the genera differ is found in the character of the bracts forming the involucre: in *Brachycome* these have a membranous margin. The species are all natives of Australasia.

Principal Species. Brachycome diversifolia (differing-leaved). Leaves variously cut and lobed. Flower-heads yellow; summer.

B. glabra (smooth). Leaves fleshy, cut in a pinnate manner; the slender segments variously cut, upper ones almost entire, fringed at the edges. Flower-heads solitary, on long footstalks; yellow disks and white rays with a violet tinge beneath.

B. iberidifolia (Iberis-leaved). Stems erect, smooth, branched, 1 foot high. Leaves pinnate, segments very slender. Flower-heads blue- or white-rayed with dark-coloured disks; June to September. Swan River (1843). Plate 128.

Cultivation. The species mentioned above are hardy annuals, and must be raised from seed. These may be sown in March on a gentle hot-bed, and the seedlings planted out when large enough and sufficiently hardened; or the seed may be sown on a sunny border out of doors, towards the end of April or beginning of May, and the seedlings thinned out to a distance of six inches apart. The plants like a sunny position, and provided they have this, soil is of secondary importance, though their preference is for dryish situations.

Description of Plate 128. The upper portion of a plant of *Brachycome iberidifolia*. Fig. 1 is an enlarged section through the flower-head; 2, a disk-floret; 3, a ray-floret; 4, a seedling.

CANADIAN GOLDEN ROD

(SOLIDAGO CANADENSIS)

Nat. size

PL. 127

DOUBLE DAISIES

Natural Order Compositæ. Genus *Bellis*

Bellis (from Latin, *bellus*, pretty). A small genus of dwarf herbs, including only seven or eight species. There is a somewhat creeping rootstock from which the toothed leaves usually rise direct, on footstalks. The flower-heads are solitary, on long scapes; the disk yellow, the rays white or pink; the involucre formed by one or two series of green bracts. The ray-florets are in a single series, strap-shaped, and all female. The disk-florets are tubular, four- or five-toothed, bisexual. There are no pappus-hairs. The species are distributed over Europe, North Africa, and North America.

Species and Varieties. Bellis perennis (perennial), our Common Daisy, is almost the only species regarded by horticulturists. The natural form is so well known that description is scarcely necessary. The leaves are stalked, oval, with a few rounded teeth, and form a rosette, from which spring the flower-heads with their crimson-tipped white rays. Its scapes are about 3 inches high, and the flowers appear nearly all the year round. Under cultivation it has shown considerable variation, generally following the line of a conversion of many or all of the disk-florets into rays, and so producing the so-called "double" flower-heads. In some of these variations the original colours have been retained, in others the crimson from the tips of the rays has spread all over them and become variously intensified. In some forms the rays have remained tolerably flat, in others the edges have become rolled inwards, producing the "quilled" varieties. Another section (*aucubæfolia*) have their leaves spotted and veined in a manner suggestive of the Aucuba-laurel, whence the name.

B. rotundifolia (round-leaved). Leaves somewhat heart-shaped or oval, with waved teeth, more or less hairy. Flowers resembling the natural form of *B. perennis*, though larger, and with fewer, broader rays. The form cultivated is the var. *cærulescens* with pale-blue rays. It was introduced from the Mediterranean region in 1872. It requires frame protection in severe winters.

Cultivation. Double Daisies are propagated by division of the plants after flowering, and planting them out in loamy soil. They are very suitable for forming continuous lines of edging, which are floriferous for a long period. The plants should be inserted very firmly in the ground at first, and will then soon get well estab-

lished. Clumps at intervals in the herbaceous border also look well. No special directions are needed for their treatment.

Description of Plate 129. The cultivated form of *Bellis perennis*. The separate flowers are from different varieties, to show the colour range. Fig. 1 is a ray-floret; 2, one of the quilled forms; 3, a section of the same.

MICHAELMAS DAISIES

Natural Order Compositæ. Genus *Aster*

Aster (Latin, *aster*, a star, from the rayed flower-heads). A large genus (about one hundred and fifty species) of perennial herbs, with radical or alternate leaves, and usually radiate flower-heads. The disk-florets are yellow, tubular, five-toothed and bisexual; the ray-florets in a single series, strap-shaped, white, blue, or purple. The involucre consists of several series of herbaceous bracts. Pappus-hairs in several series, rough and persistent, unequal in length. The species are chiefly American, but the genus is represented in most cold and temperate regions of the world.

History. Two species of *Aster*—*A. tripolium* and *A. linosyris*—are indigenous to Britain, and though neither of these is now to be found in well-kept gardens, yet there is little doubt they once had a place. *A. tripolium*, in fact, is the original Michaelmas Daisy. Unless otherwise stated, all the species here described are North American. *A. Amellus*, the first species to be introduced, was brought from Italy in 1596. *A. Tradescantii* came from North America in 1633, and from that date a steady stream of new species set in from the New World. *A. alpinus*, however, came from Europe in 1658. *A. Novæ-Angliæ* was introduced from North America in 1710, *A. grandiflorus* in 1720, *A. multiflorus* in 1732, *A. dumosus* in 1734, *A. lævis* and *A. pendulus* in 1758. *A. spectabilis* dates from 1777, *A. elegans* from 1790, *A. longifolius* from 1798, *A. altaicus* (a Siberian species) from 1804, *A. acuminatus* from 1806, *A. drucunculoides* from 1811, and *A. Bigelovii* from 1878 only. Many others have been introduced between these dates, and may occasionally be found in gardens. Within the last twenty years many beautiful seedling sports and garden hybrids have been raised in this country, where these *Asters* are greatly prized for their beautiful autumn effects. There are large representative collections of them at Kew, in the gardens of the Royal Horticultural Society at Chiswick, and in some of the leading nurseries. The colours mentioned

SWAN RIVER DAISY

(BRACHYCOME IBERIDIFOLIA)

Nat. size

PL. 128

are those of the ray-florets only, the disk-florets being always more or less yellow.

Principal Species.

ASTER ACUMINATUS (tapering). Stems angular, wavy, unbranched, 2 feet high. Leaves broad-lance-shaped, not toothed, narrowed at base, and ending in a long slender point. Flower-heads white, in panicled corymbs; September.

A. ALPINUS (alpine). Stems stout, one-flowered, 6 to 9 inches Radical leaves somewhat spoon-shaped; stem-leaves lance-shaped. Flower-heads bright purple, 1 to 2 inches across; July. European. A compact dwarf plant useful for edging purposes, and for cut flowers. There is a var. *albus* with white flowers, but it is in all respects less desirable than the type.

A. ALTAICUS (Altaian). Stems downy, branched at top, 1 foot high. Leaves narrow-lance-shaped, untoothed. Flower-heads blue-purple, 2 inches across; June and July. Northern Asia.

A. AMELLUS (Amellus-like). Stems 2 feet high. Leaves rough, blunt lance-shaped. Flower-heads solitary, numerous, purple; August. A South European species. Plate 130A. The var. *bessarabica* is larger than the type and more showy, the flowers being larger and of a deeper purple colour. The var. *amelloides* is also superior to the type. These three are of the very best of summer-flowering herbaceous plants.

A. BIGELOVII (Bigelow's). Stems $2\frac{1}{2}$ feet high. Radical leaves rather spoon-shaped, covered with rough down; stem-leaves oblong, faintly toothed, clasping the stem. Flower-heads lilac, in corymbs; June to August. Colorado.

A. DISCOLOR (parti-coloured). A beautiful little plant, 1 foot high, with a crowd of slender stems, often weighed to the ground by the profusion of purple flowers they bear in October. A good plant for the rockery, or indeed any position.

A. DRACUNCULOIDES (Tarragon-like). Stems branched corymbosely, 3 feet high. Leaves narrow-lance-shaped, slightly toothed; upper ones more slender and tapering, not toothed. Flower-heads white, in cymes; September and October.

A. DUMOSUS (bushy). Stems branched, 2 feet high. Leaves slender, smooth. Flower-heads whitish, $\frac{1}{2}$-inch across, in broad corymbs; October. There is a var. *albus* with the flower-heads quite white; var *violaceus* has them violet-purple.

A. ELEGANS (elegant). Stems 2 feet. Radical leaves oblong, stalked; stem-leaves more lance-shaped, rough. Flower-heads small, blue, in a contracted drooping corymb; September.

A. FORMOSISSIMUS (most charming). Stems 3½ feet high, with erect branches. Leaves long oval, stem-clasping. Flower-heads lilac-blue; September and October. Of garden origin. Plate 131B.

A. GRANDIFLORUS (large-flowered). Stems branched, 2 feet high. Leaves slender, rigid, partly clasping the stem. Flower-heads large, purple, solitary; November.

A. LÆVIS (smooth). Stems 2 feet high. Radical leaves oblong, slightly toothed, smooth and shining; stem-leaves half-clasping. Flower-heads blue; September.

A. LONGIFOLIUS (long-leaved). Stems 3 feet high. Leaves narrowly lance-shaped, very long and smooth. Flower-heads white, an inch across, in dense panicled corymbs; October. The var. *formosa* has pink flower-heads, and is not nearly so tall as the type.

A. MULTIFLORUS (many-flowered). Stems downy, with many branches, and these with one-sided branchlets; 3 feet high. Leaves very slender, smooth. Flower-heads white, small, in large elongated corymbs; September. Plate 132A.

A. NOVÆ-ANGLIÆ (New England). Stem erect, hairy, unbranched, 5 to 8 feet high. Leaves narrow-lance-shaped, clasping the stem, eared at base. Flower-heads violet-purple, in terminal clusters; September. There are several good varieties, viz., *pulchellus*, *roseus*, *ruber*, etc. Plate 130 B and C.

A. NOVI-BELGII (New York). Equal in value to the preceding species, which it resembles in habit, differing in having blue flowers. All the varieties of it are of first-rate quality.

A. OBLIQUUS (oblique). Stems tufted, 5 feet high. Leaves narrow-lance-shaped, oblique. Flower-heads white, numerous; October.

A. PENDULUS (drooping). Stems 2 feet high, branches spreading and drooping. Flower-heads small, pure white, becoming rosy; September.

A. PYRENÆUS (Pyrenean). Stems 1 to 1½ foot. Leaves rough, oblong-lance-shaped, toothed towards tip. Flower-heads large, lilac-blue, in few-flowered corymbs; July. Pyrenees.

A. SPECTABILIS (showy). Stems 2 feet high. Leaves lance-shaped, rough, partially clasping the stem. Flower-heads blue, involucre loose and leafy; August.

A. TURBINELLUS (top-shaped). Stems 2 to 3 feet high. Leaves lance-shaped, smooth with fringed margins. Flower-heads mauve, involucre top-shaped; August to October. Plate 132B.

A. VERSICOLOR (vari-coloured). Stems smooth, 3 feet high. Leaves broad-lance-shaped, smooth, stem-clasping. Flower-heads white, changing to purple; August. Plate 131A.

DOUBLE DAISIES

(BELLIS PERENNIS)

Nat. size

PL. 129

Culture. *Asters* must be classed among the most accommodating of plants so far as soil and situation are concerned, but they must be selected with care, for some of the species are coarse and weedy in their growth. Only the dwarfer kinds should be admitted to ordinary beds and borders, the taller sorts being relegated to the shrubbery border and the wild-garden. *A. alpinus*, *A. altaicus*, and *A. pyrenæus* are suitable for rock-work, edging, or beds. A selection of the best sorts is most valuable for the supply of cut flowers in late autumn, and when planted with judgment they are most effective in the garden. Seeds may be sown where the plants are to bloom, or in a seed-bed in March; or the plants may be divided in spring or autumn. Named varieties must be propagated by means of cuttings of the young shoots planted in sandy soil in a frame or under a bell-glass; or by division.

Description of Plates 130 to 132. Plate 130. A, Upper branches of *Aster Amellus*; B, of *A. Novæ-Angliæ*; C, flower-head of *A. Novæ-Angliæ*, var. *roseus*. Fig. 1, a ray-floret enlarged; 2, a disk-floret enlarged.

Plate 131. A, Flowering shoots of *A. versicolor*: Fig. 1, section of flower-head; 2, ray-floret; 3, disk-floret. B, *A. formosissimus*: Fig. 4, section of flower-head; 5, ray-floret; 6, disk-floret.

Plate 132. A, Flowering shoots of *A. multiflorus*: Fig 1, section of flower-head enlarged; 2, ray-floret; 3, disk-floret. B, *A. turbinellus*: Fig 4, section of flower-head enlarged; 5, disk-floret; 6, ray-floret.

CHINA ASTERS

Natural Order COMPOSITÆ. Genus *Callistephus*

CALLISTEPHUS (from Greek, *kallistos*, most beautiful, and *stephane*, a crown). A genus consisting of only one annual species, from which has been evolved by selection and inter-crossing all the varieties of China, French, and German Asters, upon which the gardener largely depends for his late summer and autumn displays. The principal character upon which the genus is founded is, an involucre of fringed bracts and a double pappus—the "beautiful crown" that surmounts the seed.

CALLISTEPHUS CHINENSIS (Chinese). Stems bristly, branched, 2 feet high. Leaves oval, coarsely toothed, the lower ones stalked, the upper ones not. Flower-heads rosy lilac, each terminating a separate shoot; July.

History. *Callistephus chinensis* is a native of China, introduced in 1731; and the first European specimens were raised

in the Jardin des Plantes in Paris from seeds which Father d'Incarville, a Jesuit missionary, had sent from China. On reference to Plate 133 the natural form of the flower will be seen above the other figures. This, it will be observed, is similar in structure to that of Michaelmas Daisy, the strap-shaped or "ray"-florets being confined to the circumference of the flower, the centre or "disk" being occupied by regular, tubular flowers. The French horticulturists set themselves to turn all these disk-florets into ray-florets, and we see the results of their labour in Truffaut's Perfection and Peony-flowered Asters. Of course, English and German growers have co-operated in this work, but the chief praise is due to France. Fortunately, with this "doubling" process, as it is not very accurately termed, the flowers have remained fertile, and produce seeds that grow into plants with similar flowers to those of the parent. The garden forms may be divided into two chief classes: I. PYRAMIDAL; II. QUILLED. These are subdivided into smaller sections, of which the following are the principal:—

TRUFFAUT'S PEONY-FLOWERED. Flower-heads large, hemispheric, 4 inches across, with petals incurved towards the centre; the plants about 2 feet high.

CHRYSANTHEMUM-FLOWERED. Flower-heads like Chrysanthemums, with petals curving outward from the centre; plants about 1 foot high.

IMBRICATE-FLOWERED. Flower-heads of very regular form, the petals recurved like the last; brilliantly coloured, but producing seed sparingly; 2 feet high.

DWARF BOUQUET. Very free bloomers, about a foot high, each plant producing so large a number of flower-heads that it looks like a well-disposed bouquet.

CROWN ASTERS. Flower-heads large, flat, the disk-florets differing in colour and shape from those of the circumference, which alone are rayed. Height from 12 to 18 inches.

VICTORIA ASTERS. Flower-heads globular, inner florets overlaying the outer; in various bright colours; 4 inches across. Plant of pyramidal habit, about 1 foot high. Ten to twenty flower-heads on a plant.

BETTERIDGE'S PRIZE ASTERS. These are favourites for show purposes, but as they are of less compact habit than the other sections, are not so suitable for general garden use.

Cultivation. Asters are widely grown in gardens without much consideration as to soil, but to get the best results from them they should be planted in loam enriched by liberal manuring.

MICHAELMAS DAISIES

(*A*) ASTER VERSICOLOR — (*B*) ASTER FORMOSISSIMUS

Nat. size

PL. 130

They do not root deeply, and therefore require free watering during dry weather, and a mulching of the surface with well-rotted manure. The seeds should be sown in April, in a box or pan in light soil, and given the protection of a frame. In a fortnight or three weeks after the seedlings have appeared they will be large enough to prick out in larger boxes or in a frame, to be planted out in beds or borders later on; or they may be at once transferred to the places in which they are to bloom, pricking them out at distances of about a foot apart. If intended for blooming in pots, the first method should be adopted, and they should then be left until the flower-buds are swelling, then removed with a good ball of earth around the roots and potted. The dwarf kinds should be selected for potting and bedding, those of greater stature for the border.

Description of Plate 133. *Callistephus chinensis* and cultivated varieties; the uppermost figure being the natural form. The separate figures are—1, disk-floret; 2, ray-floret.

FLEABANES

Natural Order Compositæ. Genus *Erigeron*

Erigeron (Greek, *eri*, early, and *geron*, an old man, suggested by the hoary pappus of some species). A genus of about eighty species of perennial herbs with the characters of *Aster*, except that the ray-florets in *Erigeron* are in several series, whilst in *Aster* they are in one. The fruits also are more slender in *Erigeron* than in *Aster*. The species are distributed throughout the Temperate and cold regions of the world; two of them being natives of Britain. *E. canadense* is a naturalised weed in some parts of England. It is said that a single seed of this species came to Europe in a stuffed bird in the seventeenth century, and its progeny has spread widely over the Continent as well as in this country.

Principal Species. Erigeron aurantiacus (orange). Stem 1 foot high. Lower leaves oblong, stalked, not toothed; upper ones lance-shaped, stalkless. Flower-heads solitary, bright orange, 2 inches across; August. Introduced from Turkestan (1879).

E. grandiflorus (large-flowered). Stems 4 to 8 inches high. Radical leaves spoon-shaped; stem-leaves oblong or lance-shaped. Flower-heads large, purple or whitish, solitary; July and August. Introduced from Rocky Mountains (1819).

E. MULTIRADIATUS (many-rayed). Stems 6 to 24 inches high. Leaves stalked, oblong, toothed. Flower-heads terminal, solitary, 2 inches in diameter, purplish; June to August. Introduced from Himalaya (1880).

E. ROYLEI (Royle's). Stems 4 to 8 inches high. Leaves oblong-spoon-shaped, fringed. Flower-heads bluish purple, 2 inches across, in loose corymbs; June to August. Native of Himalaya.

E. SPECIOSUM (showy). Stems rounded, 18 inches high. Radical leaves spoon-shaped, stalked; stem-leaves stalkless, oblong, fringed. Flower-heads large, violet, the rays exceedingly slender; July to September. Native of Western North America. Plate 134.

Cultivation. The directions given for the culture of Michaelmas Daisies will apply equally to the Fleabanes, which are propagated by seed and division of the clumps.

Description of Plate 134. Upper portion of *Erigeron speciosum.* Fig. 1, section of flower-head; 2, a ray-floret; 3, a disk-floret.

EVERLASTING FLOWERS, I

Natural Order COMPOSITÆ. Genus *Helipterum*

HELIPTERUM (Greek, *helios*, the sun, and *pteron*, a wing). A genus comprising about forty species of herbs, rarely small shrubs, which with the following genera have the bracts of the involucre large, numerous, coloured like petals, but of a dry translucent character, which gives them their "everlasting" quality. There are no real ray-florets. They are chiefly distinguished from the species of *Acroclinium* and *Helichrysum* by the pappus-hairs, which are in this genus branched and plumelike (see Plate 135, Fig. 1). The species are South African and Australian.

History. The genus *Helipterum* is of comparatively recent introduction to British gardens, where some of the species are better known under the name of *Rhodanthe.* These plants have, in fact, been at one time or other members of a number of genera, such as *Gnaphalium, Spiralepis, Astelma, Xeranthemum*, and so forth. *H. canescens* (introduced from the Cape in 1794) is not often seen in cultivation now; neither is the earlier *H. speciosissimum* (introduced 1691), nor the fine *H. eximium* (1793). These are greenhouse shrubs, but there are several Western Australian annuals that are more popular: *H. humboldtianum* (introduced 1863) and *H. Manglesii.* These, taste-

MICHAELMAS DAISIES

(*A*) ASTER MULTIFLORUS (*B*) ASTER TURBINELLUS

Nat. size

PL. 131

fully arranged with other species from allied genera, have been much used for winter decoration. For this purpose the flowers are gathered as soon as fully expanded, and dried in a shady place, when they keep their form and colour.

Principal Species. HELIPTERUM HUMBOLDTIANUM (Humboldt's). Stems 1 to 2 feet high; whole plant white and woolly at first, afterwards smooth. Leaves slender. Flower-heads small, in dense corymbs; the petal-like bracts at first yellow, becoming green in drying; July and August.

H. MANGLESII (Mangles'). Stems erect, branched, smooth, 12 to 18 inches. Leaves broad-lance-shaped, eared at base, clasping the stem. Flower-heads large and showy, on long stalks; coloured bracts, pink, rosy, or deep purple at the base, florets yellow or purple; July and August. The var. *alba* has white bracts and yellow florets. The type and var. are shown in Plate 135. Commonly known as *Rhodanthe Manglesii.*

Cultivation. The above species are annuals, and to grow them the seeds should be sown at the end of March or beginning of April, on rich soil in a warm sunny position out of doors. *H. Manglesii* is grown in large quantities as a pot-plant for the London market. For this purpose the seeds are sown in March, in five-inch pots, in light sandy soil and placed in a close frame or in a warm greenhouse; the young plants when large enough to handle are thinned out, about ten seedlings being left in each pot. They require careful watering and plenty of sunshine always. When in flower they may be placed in the open air. This plant also thrives when sown in a border in light sandy soil in a sunny position.

Description of Plate 135. *Helipterum Manglesii*, the Rosy Everlasting Flower, is shown of the natural size. The fully-expanded head to the left of the Plate with the dark ring round the disk is the var. *maculata.* The white heads are those of the var. *alba.* Fig. 1 is a single floret enlarged, and Fig. 2 is the fruit enlarged and natural size.

EVERLASTING FLOWERS, II

Natural Order COMPOSITÆ. Genus *Acroclinium*

ACROCLINIUM (from the Greek, *akros*, lofty, and *kline*, a bed). A small genus of herbs of similar appearance to *Helipterum*, but differing chiefly in the character of the pappus-hairs. As we have seen, these are feathery in the case of *Helipterum*, and in *Acroclinium* they may

also be said to be feathered, though very slightly; but here they are also connected together at the base and tipped with a yellow tassel-like brush. In general habit these plants differ from *Helipterum*, being more erect, branched from the base with equally erect branches, each ending in a single large flower-head. The leaves are very slender, pointed, and stalkless. The few species are Australian. Only one of these, with its varieties, is found in cultivation.

Species. ACROCLINIUM ROSEUM (rosy). Stems erect, 1 to 2 feet high. Leaves very slender, scattered. Flower-heads solitary, at end of erect slender branches; outer bracts brown, inner white or rosy; florets deep yellow; August. Introduced from Champion Bay, Western Australia (1854). Plate 136. There is a form with white bracts (var. *alba*) and another (var. *grandiflorum*) with flowers larger than in the type.

Cultivation. This is a half-hardy annual, and the seeds should not be sown out of doors until the end of May or beginning of June. If, however, they are wanted for greenhouse or conservatory decoration—for which purpose they are very suitable—the seed should be sown in pots about August or September, and raised in a cold frame. They will then flower during the winter. The soil most suitable is a light loam, to which has been added well-rotted manure; and the situation chosen should be a sunny one. If desired for early summer-flowering, the seed should be sown upon a hot-bed in March, the seedlings pricked into pots and gradually hardened before transplanting in bed or border about the end of May. Where convenient both these methods may be followed, and a succession thus ensured. Like those of *Helipterum*, the flower-heads of *Acroclinium* are very useful for winter bouquets if gathered soon after expansion and dried in shade.

Description of Plate 136. Upper portions of branches, *Acroclinium roseum*, giving different aspects of the flower-heads, with an example of the var. *alba*. Fig. 1 shows the flower-head in section; 2, a single floret enlarged; 3, the same in section; 4, the fruit, natural size and enlarged; 5, a seedling.

IMMORTELLES

Natural Order COMPOSITÆ. Genus *Helichrysum*.

HELICHRYSUM (Greek, *helios*, the sun, and *chrysos*, gold). A genus comprising about two hundred and sixty species of herbaceous or

CHINA ASTERS

(CALLISTEPHUS SINENSIS, *vars.*)

$^1/_2$ Nat. size

PL. 132

shrubby "Everlastings." They are distinguished by the bracts not being silvery or transparent, and by the pappus-hairs being rather rough than plumy. The species, of which only a few are cultivated in this country, are principally natives of the Cape, Australia, and the Mediterranean region.

History. Several species of *Helichrysum* are largely grown to supply the makers of funeral wreaths and memorial crosses. *H. orientale* has given rise to an important industry for this purpose in the South of France, the branches being gathered before seeds are produced, and dried by hanging with flower-heads downwards; they are then dyed various colours. This species, which is a native of Crete and Asia Minor, was introduced to Britain in 1629. *H. arenarium*, the Yellow Everlasting of our gardens, is a native of Europe, introduced in 1739, and *H. bracteatum*, the species most widely grown, *the* Immortelle, was not known until 1799, when it came from Australia. Several varietal forms of this plant have been introduced at various dates as distinct species.

Principal Species. HELICHRYSUM APICULATUM (pointed leaves). Whole plant covered with silvery wool. Stems about 18 inches. Leaves narrow-lance-shaped, ending in a little point. Flower-heads small, yellow, clustered in corymbs; flowering during greater part of the year. Introduced from Tasmania (1804).

H. ARENARIUM (sand-loving). Yellow Immortelle. Stems erect, unbranched, downy, 6 to 12 inches. Leaves lance-shaped, stem-clasping, edges turned back, covered with white down. Flower-heads golden yellow, in compound terminal corymbs; June to August.

H. BRACTEATUM (bracts conspicuous). Stems, branched above, 3 to 4 feet. Leaves lance-shaped, untoothed. Flower-heads large, terminal, colour varying in the several varieties; August. Hardy perennial. Plate 137. Among the named varieties may be mentioned *aureum*, with golden-yellow flower-heads; *bicolor*, with yellow heads; *compositum*, varying in colour; *macranthum*, with large white heads, rosy outside; *niveum*, large, white or yellow.

H. GRANDIFLORUM (large-flowered). Stems 3 feet high. Leaves oval-oblong, woolly above, clasping the stem. Flower-heads white, cylindrical, in corymbs; June to August. Introduced from the Cape (1731). A sub-shrub requiring greenhouse treatment.

H. PLICATUM (folded). Stems prostrate, tufted, woolly. Leaves slender, stalked. Flower-heads large, white, in corymbs; August. Introduced from Macedonia (1877).

A. STÆCHAS (Stæchas-like). Goldylocks. Stems branching, covered

with silvery down, shrubby, 1 foot high. Leaves very slender, stalkless, silvery beneath. Flower-heads yellow, in crowded corymbs; June to August.

Cultivation. *Helichrysums* are propagated by seeds, cuttings, or division, according to the duration of the species, whether annual or perennial. The annuals should be sown in the open border at the beginning of April, and the seedlings thinned out or pricked out in May at a distance of about a foot apart. A light though rich loamy soil suits them best Cuttings of the perennials should be taken in spring and inserted in a close, almost cool frame.

Description of Plate 137. *Helichrysum bracteatum* and varieties. An enlarged section of the flower-head is shown at 1; Fig. 2 is a single bract; 3, a floret with its pappus; Fig. 4, the fruit, natural size and enlarged; 5, a seedling.

COMPASS-PLANTS

Natural Order Compositæ. Genus *Silphium*

Silphium (from *Silphion*, a classical Greek plant name). A genus of about a dozen perennial herbs which exude a resinous juice. The leaves are large, toothed, lobed, or almost entire. The flower-heads are always yellow; the ray-florets strap-shaped, female; disk-florets tubular, male. The fruits are smooth, surrounded by a wing, which is notched at the top. The species are restricted to North America.

History. With a few exceptions, *Silphiums* can only be regarded as weeds in their native habitat. Most of the species have been introduced, but with one exception they are scarcely ever grown. The exception is *Silphium laciniatum*, the so-called Compass-plant, Polar-plant, or Pilot-weed, which grows upon wide, open prairies, and is reputed to hold its leaves erect in such manner that the two faces always look north and south, and so serve the purpose of a compass to the wanderer. The younger specimens are said to do this more effectually than the fully-grown ones; but the evidence of certain travellers has gone to discredit these statements by contending that the leaves cannot be at all relied upon to perform the function ascribed to them. Our readers who may grow this species will perhaps be interested in carefully observing the attitude of the leaves, and noting how far the popular name is deserved. It was introduced from North America in 1781.

MICHAELMAS DAISIES

(*A*) ASTER AMELLUS (*B*) ASTER NOVÆ-ANGLIÆ

(*C*) ASTER NOVÆ-ANGLIÆ, *var. roseus*

Nat. size

PL. 133

Principal Species. SILPHIUM LACINIATUM (torn). Stem rough with bristles, 3 to 6 feet high. Radical leaves 1½ to 2½ feet long, lance-shaped in general outline, but cut up into many slender lobed segments; stem-leaves smaller, more simply lobed in a pinnate manner. Flower-heads 1 to 2 inches across, in a loose raceme; July.

S. PERFOLIATUM (stem passing through leaves). Cup-plant. Stem square, 4 to 8 inches high. Leaves oval, entire, 6 to 15 inches long; upper pairs joined by their bases, thus forming a cup round the stem; lower ones on winged footstalks, which expand and unite by their bases. Flower-heads arranged in corymbs; July. Introduced 1766.

S. TEREBINTHINACEUM (turpentiny). Prairie Burdock. Stem smooth, 4 to 10 feet high, branched near the summit. Leaves rough, oval, somewhat heart-shaped, 1 to 2 feet long, on slender stalks. Flower-heads small; July to September. Introduced 1765.

Cultivation. From what has been said of the character of these plants as weeds on the American prairies, it will be understood that their cultivation is a simple affair. They are somewhat coarse-growing plants and most suitable for the wild-garden or to cover unsightly objects in the garden. They thrive in any kind of soil, even wet clayey soil agreeing with them. Propagation is most easily effected by dividing the clumps.

YOUTH AND AGE

Natural Order COMPOSITÆ. Genus *Zinnia*

ZINNIA (named in honour of Professor John G. Zinn of Gottingen, 1727–1759). A genus comprising about a dozen species of half-hardy annuals or perennials, herbs or sub-shrubs, with entire, opposite leaves, and solitary flower-heads. The involucre is more or less bell-shaped with several series of bracts; the ray-florets strap-shaped in one series, the disk-florets tubular, five-cleft at the mouth. The species are restricted to America as a natural habitat, and most of them are peculiar to Mexico.

History. *Zinnias* have been known in British gardens since the year 1753, when *Z. pauciflora* was introduced, followed seventeen years later by the similar *Z. multiflora*. *Z. elegans*, the most important species, and the only one generally grown, was introduced a hundred years ago. Cultivation has turned its single series of ray-florets into many, so that the disk-florets are few. There are a number of garden varieties, as well as some hybrid forms, of which *Z.*

elegans is one of the parents. They are esteemed on account of the variety of tints of their flowers and the long period during which they are in bloom, the ray-florets retaining their form and colour until the seeds have ripened.

Principal Species. ZINNIA ELEGANS (elegant). Stem erect, hairy, 2 feet high. Leaves long-oval, stalkless, stem-clasping. In a natural condition the flower-heads are some shade of scarlet, but the cultivated forms, of which a few are shown in Plate 138, vary from white, through yellow and buff to scarlet, crimson, rose, and purple; about 2 inches across; June to September.

Z. HAAGEANA (Haage's) is very similar to the last, but not quite so tall. The flower-heads have ray-florets of an orange or deep-yellow tint. Stem and leaves covered with hairy down. Introduced 1862. Also known as *Z. Ghiesbrechtii.*

Z. LINEARIS (linear-leaved) forms neat little bushes, 1 foot high, with a profusion of golden flower-heads, a couple of inches across; and very slender, dark-coloured leaves. Introduced 1887.

Z. MULTIFLORA (many-flowered) has scarlet ray-florets, whilst those of the disk are yellow. The leaves oval-lance-shaped, obscurely stalked, and the branching stems are but slightly hairy, 2 feet high.

Cultivation. The species mentioned are all annuals, and must be raised from seed. This should be sown on slight bottom heat towards the end of March, and as soon as the seedlings are large enough they should be pricked out and covered with a frame. By June they will be nice plants fit for transplanting into beds or borders in sunny positions, where they will soon bloom. Ordinary garden soils that are not very damp will suit *Zinnias*, but a light rich loam is the best for them. They should be planted about nine inches apart.

Description of Plate 138. Cultivated varieties—*Z. elegans*: Fig. 1, the fruits; 2, a seedling. The flower-heads here depicted give a fair idea of the colour variation.

SUNFLOWERS

Natural Order COMPOSITÆ. Genus *Helianthus*

HELIANTHUS (Greek, *helios*, the sun, and *anthos*, a flower). A genus of about fifty tall-growing, coarse, annual or perennial herbs, with large, rough, undivided leaves, and very large flower-heads. The ray-florets always yellow, the disk-florets purple or violet. All the species are

SHOWY FLEABANE
(ERIGERON SPECIOSUM)

Nat. size

PL. 134

American, for the most part confined to the north of the Continent, but a few are found in Chili and Peru.

History. *Helianthus annuus*, the Common Sunflower, is as frequent in our gardens, perhaps, as any exotic grown here. During the three centuries of its sojourn in Europe it has contrived to find its way into most cottage-gardens, whilst retaining favour in more ambitious enclosures. This wide distribution is explained by its liberal fruiting, which enables the grower of a single plant to spare his neighbour a handful of the large oily seeds. In many places, indeed, one may see Sunflowers grown in fields for the sake of these seeds, which make an admirable poultry food, especially esteemed, we believe, by turkeys. Another species, *H. tuberosus*, more familiarly known as the Jerusalem Artichoke (though not an Artichoke and having not the remotest connection with Palestine), is grown for human food, the creeping roots producing in autumn a number of irregular tubers, something like potatoes with the flavour of artichokes. This plant was introduced in the year 1617, and was distributed from the Farnese Gardens at Rome under the name of *Girasole Articocco* (Turn-sun or Sunflower-Artichoke). Our ancestors, with the native genius for explaining the unknown by the known, soon converted the first word into Jerusalem, and so it has remained ever since. *H. multiflorus* dates from 1597, and is by some thought to be a garden variety of *H. decapetalus*, because it is known only as a cultivated plant. It is still widely believed that the flowers of *Helianthus* all turn to the east in the morning, and so far keep pace with the great luminary that at sunset they all turn westward. A little careful observation would suffice to dissipate this notion; but poetry is stronger than fact, and Tom Moore having declared in one of his well-known melodies that "The sunflower turns on her god, when he sets, the same look which she turned when he rose," people accept that as truth without troubling to test it.

Principal Species. HELIANTHUS ANNUUS (annual). Common Sunflower. Stem stout, ridged and rough, 6 to 10 feet high. Leaves large, oval, rough. Flower-heads larger than those of any other member of the genus; summer and autumn. There are several well-marked varieties in cultivation. Of these *globosus fistulosus* is perhaps the best and largest; its disk-florets having become mostly strap-shaped, it has a very rotund, bright appearance.

H. ARGOPHYLLUS (silver-leaved). Silver-leaved Sunflower. Very similar to the last, but the downy stem less robust, not more than about 6 feet high; the leaves covered with a dense white silvery down. The flower-heads are smaller, but more numerous than in *H. annuus*; August and September. Annual. Native of Texas.

H. LÆTIFLORUS (cheerful-flowered). Stem 6 feet high, branched, bearing a great number of flower-heads, which are 3 or 4 inches across, on slender footstalks; August and September. A perennial. Introduced from North America (1810).

H. MULTIFLORUS (many-flowered). Stems 4 or 5 feet high. Leaves slightly toothed. Flower-heads, numerous, 3 or 4 inches across, the disk-florets yellowish brown; August and September. A perennial.

H. ORGYALIS (a fathom). Stem 6 to 10 feet high, covered with long, slender, down-curved, alternate leaves, 6 inches or more in length, which give a very light and graceful appearance to the plant. Flower-heads small and numerous, in a leafy panicle; August and September. A perennial. Introduced from the United States (1879).

H. RIGIDUS (rigid). Stem bristly, 3 or 4 feet high. Radical leaves oval, few; stem-leaves lance-shaped, bristly, slightly toothed, whitish. Flower-heads 3 to 4 inches across; disk-florets chocolate; August. A perennial. Introduced from North America (1821).

Cultivation. Most persons who have made even small attempts at gardening are aware how easy it is to grow Sunflowers. The perennial species and their varieties are most valuable plants for the herbaceous border or for large beds on lawns. They also look well when planted in large masses among trees such as CONIFERÆ. The named varieties, such as *Miss Mellish*, can only be multiplied by division. They do fairly well in any garden soil, but a good, light loam is best calculated to bring out their full beauty. They require a sunny position, and plenty of room. This last is a point often forgotten when planting them in small gardens, and the result is a clump of poor half-starved dwarfs. Half the number of specimens in double the amount of space would make a far finer show. They may all be propagated by seed sown in the open border, or in pots, in March, and the young plants afterwards pricked out at distances of about twenty inches apart. The perennials may also be increased by dividing the clumps.

Description of Plate 139. Upper portions of *Helianthus argophyllus*. Fig. 1 is a seedling; 2, a ray-floret; 3, a disk-floret; 4, the fruit, natural size and enlarged.

COREOPSIS

Natural Order COMPOSITÆ. Genus *Coreopsis*

COREOPSIS (Greek, *koris*, a bug, and *opsis*, likeness; the fruit resembling a bug). A genus of showy herbs with opposite leaves. The flower-

ROSY EVERLASTING FLOWER

(HELIPTERUM MANGLESII)

Nat. size

PL. 135

heads have two kinds of florets, as in several genera already described; the ray-florets are sterile, whilst those of the disk contain both stamens and pistil. The fruit is flattened on one side, convex on the other, with thin transparent edges, and the pappus taking the form of two awns, somewhat resembling the antennæ of an insect. The species are natives of North America.

History. For nearly two hundred years *Coreopsis* has been represented in our gardens by *C. auriculata*, a perennial plant, which was introduced from North America in 1699. But the species that are best known and most widely cultivated to-day are three annuals—*C. tinctoria*, *C. Drummondi*, and *C. coronata*, introduced respectively in 1822, 1834, and 1835, and often mentioned by the name of *Calliopsis*. These by selection and careful growing have yielded some improved forms which are much in request for summer-flowering. *C. aristosa* is of quite recent (1869) introduction from the United States.

Principal Species. COREOPSIS ARISTOSA (bearded). Stem 3 feet high. Leaves deeply cut in a pinnate fashion, segments lance-shaped. Flower-heads large and numerous, orange-yellow, in a terminal panicle; September. Perennial.

C. AURICULATA (eared). Stems slender, branched, 12 to 20 inches. Leaves entire, sometimes three-lobed, eared at the base. Flower-heads yellow, with a band of purple-brown surrounding the disk; ray-florets four-toothed; solitary, on long stalks; July to September. Perennial.

C. CORONATA (crowned). Stem erect, 1 to 2 feet. Leaves spoon-shaped, entire, or cut in a pinnate manner. Flower-heads orange, spotted with brownish purple, on long stalks; July to October. Annual.

C. DRUMMONDI (Drummond's). Stems spreading, slightly hairy, 1 foot high. Leaves, cut into oval or lance-shaped lobes, arranged pinnately. Flower-heads $1\frac{1}{4}$ inch across, yellow, with ring of crimson-brown around the disk; July to September. Annual.

C. LANCEOLATA (lance-shaped). Stem, sometimes branched from the base, 1 to 3 feet high. Leaves lance-shaped, fringed with hairs, the upper pairs slightly joined by their bases. Flower-heads bright yellow, 2 or 3 inches across; ray-florets four-toothed; solitary, on long stalks; July to September. Perennial. Introduced from North America (1724).

C. TINCTORIA (stained). Stems slender, 2 feet high. Leaves divided into very slender segments, arranged pinnately. Flower-heads $1\frac{1}{4}$ inch across; yellow and purple-brown, the ray-florets three-lobed, varying much in the disposition of the two colours; in some specimens the dark tint is a mere ring round the disk, in others it almost covers the ray, leaving only the tip yellow (see Plate 140); May to August. Annual.

Several of the colour variations are given distinct names in seedsmen's catalogues. There is a var. *nana*, differing from the type by its dwarf habit.

C. VERTICILLATA (whorled). Stem furrowed, branched, 1 to 2 feet high. Leaves divided into very slender segments; in whorls. Flower-heads numerous, golden yellow, 1½ inch across; June to September. Perennial. Introduced from the United States (1759).

Culture. The annual species of *Coreopsis* should be grown much after the manner of hardy annuals in general. Seed may be sown in pans in frame or greenhouse some time in March, and the seedlings planted out in May, or sown in the open bed or border at the end of April, and the young plants thinned out. The perennials may also be propagated by seeds, but preferably by division of the plant in spring or autumn. Cuttings of the perennials may be freely struck in summer, by taking the young shoots and placing them in a cold frame. Ordinary garden soils suit all the species. The dwarfer kinds are suitable for bedding and edgings to borders, whilst the taller sorts should be confined to the border.

Description of Plate 140. Portions of *Coreopsis tinctoria*, from three separate plants, to show colour variation. Fig. 1 is a section of the flower-head, and 2, a ray- and a disk-floret.

DAHLIAS

Natural Order COMPOSITÆ. Genus *Dahlia*

DAHLIA (named in honour of Dr. Dahl, a pupil of Linnæus; it should therefore be pronounced Dah-lia, not as commonly sounded, Day-lia). A small genus of herbaceous perennials, natives of Mexico and Central America. They are distinguished from other Composite plants by the fact that the involucre is double, one series of green bracts being turned down towards the stalk, whilst the other is pressed against the flower-head; there is no pappus, but each floret has a dry, translucent bract at its base. The roots are fleshy and spindle-shaped.

History. The horticultural history of the Dahlia is recent. *Dahlia variabilis* was discovered by Cervantes, the Director of the Mexican Botanic Gardens, and by him sent to his native country (Spain) towards the end of last century. From this stock the Marchioness of Bute introduced the Dahlia to England in 1789, but the specimens failed, as did a second supply obtained by Lady Holland in 1804. These are said to have been lost, because it was thought that a

ACROCLINIUM ROSEUM

Nat. size

PL. 136

light sandy soil was the fitting earth for them, the originals having been found in sandy meadows at an altitude of 5000 feet. In 1800 the Abbé Cavanilles, by whom the genus was created, sent specimens of *D. coccinea* to Thouin, Professor of Culture in the Muséum d'Histoire Naturelle at Paris. These were the first Dahlias cultivated in France, and they were grown for the sake of the tubers, which were, however, rejected alike by men and cattle. From this batch a third consignment came to England in 1815, and with more liberal treatment it succeeded, and became greatly modified by cultivation. Other species have been introduced in later years, and some of these have had their share in the production of the enormous number of varieties now included in the catalogues of professional growers. Among these later introductions may be mentioned *D. excelsa*, *D. imperialis* (1863), *D. Juarezii* (the Cactus Dahlia, which originated under cultivation in Mexico), *D. Mercki* (1839).

Principal Species.

DAHLIA COCCINEA (scarlet). Stems 3 to 4 feet high. Leaves pinnately divided into lance-shaped leaflets, rough. Flower-heads with yellow disk-florets and scarlet rays; August to October.

D. EXCELSA (tall). Stem becoming woody, thick and tree-like, 20 feet and more in height. Leaves $2\frac{1}{2}$ feet long by 2 feet broad, divided into pinnate leaflets, which are themselves pinnately lobed. Flower-heads 4 inches across, rays pale lilac-purple; late autumn. Should be grown in pots or tubs, to be taken into greenhouse before the first frosts.

D. IMPERIALIS (imperial). Stems 10 to 12 feet high. Flower-heads white with lilac tinge, and streaks of deep red at the base of the ray-florets; bell-shaped and drooping, disposed in enormous panicles; late autumn. Requires similar treatment to *D. excelsa*.

D. JUAREZII (Juarez'). Cactus Dahlia. Stems 3 feet high. Flower-heads brilliant scarlet; florets rayed of varying lengths, overlapping, giving the head an appearance quite distinct from the others. A garden form.

D. MERCKI (Merck's). Stems 2 to 4 feet high. Leaves pinnately divided, the leaflets pinnately lobed. Flower-heads with white or lilac rays and yellow disks; small, but of good form; October. Introduced 1839. The var. *Decaisneana* has purple rays.

D. VARIABILIS (variable). Stems 4 to 6 feet high. Leaves pinnately compound, the leaflets lobed. Flower-heads very variable in colour, the disk-florets yellow, the rays white, yellow, or some shade of scarlet August and September. By cultivation the disk-florets were turned into rays, producing the so-called "double" flower-heads. The original forms are shown in Plate 141.

Cultivated Varieties.

The enormous number of garden varieties of Dahlias receives many additions every year, and any selection is

likely to be soon out of date. We shall, therefore, be content with giving a brief list representing the various sections without pretending that it contains the best or newest forms. For these we recommend the reader to consult the lists of the large growers who make Dahlias a special feature of their business.

Show and Fancy Varieties.

Duchess of York, lemon-veined, and edged with salmon-pink, 4 feet.
George Gordon, large, bright crimson, 4 feet.
John Walker, large, pure white, 2½ feet.
Le Colosse, very large, reddish, 3½ feet.
Norma, large, orange-buff, 4 feet.
Octavia, yellow shaded with orange, and tinged with rosy purple, 3 feet.
Mabel Stanton, clear yellow, dwarf habit, 3 feet.
Mrs. West, silvery pink.
Shotesham Hero, white, tipped and shaded rose, 3 feet.

Pompone Varieties.

A. E. Searle, bright orange, dwarf.
Capt. Boyton, dark maroon, shaded crimson.
Cecil, red, tipped with white.
Ceres, deep cream.
Eric, small, scarlet tipped, striped white.
Eva, rosy carmine, neat.
Florence Woodland, yellow, edged with crimson.
Hilda, deep rose, tipped and striped white.
Irene, rosy purple, tipped with white.
La Petite Barbier, pure white, quilled.
Model, fawn, blotched and shaded with pink.
Pomponei, creamy pink, primrose centre.
Rowena, yellow with scarlet edge.
Sovereign, bright yellow.
Zoar, dwarf, yellow, edged pink.

"Single" Varieties.

Annie Hughes, rays clear yellow, shading to peach at margins.
Chilwell Beauty, bright chestnut belted with deeper tint.
Duchess of Fife, amber, edged with deep orange.
Duke of York, orange-scarlet, with yellow ring round disk.
Eclipse, rich scarlet-crimson, with orange ring round disk.
Faust, rich crimson.
Gertrude, lilac-rose, with yellow ring.
Kitty, white, tinged rosy mauve.
Lady Helen, clear bright yellow, tipped with white.
Miss Jefferies, mauve and magenta, with red ring.
Mr. Rose, bright rose, striped with pure white.
Northern Star, bright red, edged with golden yellow.
Yellow Satin, clear pale yellow.

Cactus Varieties.

Beauty of Wilts, terra cotta, shaded with red.
Blanche Keith, pure yellow.
Cannell's Brilliant, maroon-crimson.
Duchess of York, rich orange-red.
Ernest Glasse, purple-magenta.
Mrs. A. Peart, pure white.
Robert Cannell, magenta, with bluish tinge.
Salisbury White, snow-white, small.

Cultivation. Most gardens will produce a good show of Dahlias, but to obtain from these plants the best results they should be grown in a somewhat heavy and rich soil. If the ground in which it is proposed to plant Dahlias is in need of manure, this should be added the previous autumn or winter, otherwise it will tend to over-

IMMORTELLES

(HELICHRYSUM BRACTEATUM, *vars.*)

Nat. size

PL. 137

luxuriance of foliage and poverty of flowers. The taller varieties should be planted at the back of borders, and well staked. For beds the smaller kinds, such as the Pompones, are more suitable, and these may be improved for the purpose by pegging down the branches. The so-called "doubles" yield little seed, and are mostly raised from cuttings or divisions of the roots. The "singles" produce seeds freely. These should be soaked in water for a few hours before sowing them on pans of light earth in March. The pans should be placed in gentle heat; the seedlings potted singly, and hardened gradually before planting out at the end of May or beginning of June. Cuttings are made from the young shoots soon after they start from the tubers, which have been placed in heat in February for the purpose of starting growth. When the shoots have two joints they are removed and potted singly in sandy leaf-mould. In a close frame these soon emit roots and need repotting early, prior to being hardened off. They will be ready for planting out in June. Almost any number of plants may be raised from a few tubers in this way, by syringing the roots and inducing them to throw out a succession of shoots. Another method of propagation more frequently adopted in small gardens is to start growth from the collar of the undivided tubers by placing them in heat in March, and then separating the tubers, taking care so to divide them that each has its own shoot. If these are potted singly, and grown on until June, they will then be vigorous plants for setting in the open ground. Grafting is also resorted to for the propagation of delicate varieties. When the tops of the Dahlia-plants have been blackened by autumnal frosts, they should be cut down to within half a foot from the ground, the roots lifted with a fork, and the bulk of earth clinging to them removed without injuring the tubers. They should then be dried in the air, and stored in a cool, dry place until required for re-starting in spring. In so moving them care should be taken not to separate the tubers from the old stem, for it is from this part that the new shoots will break.

Description of Plate 141. Leaves and flower-heads of *Dahlia variabilis* showing colour range. The characteristic double involucre is well seen in the bursting bud at the top of the Plate.

COSMOS

Natural Order Compositæ. Genus *Cosmos*

Cosmos (Greek, *kosmos*, an ornament). A small genus of annual or perennial herbs, allied to *Dahlia*, with which they agree in the

possession of a double involucre, the lower series of which spreads. The disk is beset with membranous coloured scales, which are drawn out to a fine point, and equal or exceed the disk-floret in length. The leaves are pinnate. The fruits are four-angled, tapering to each end, crowned with two to four rigid bristles. The species are all natives of Mexico. Only two or three are in cultivation.

Principal Species.

COSMOS BIPINNATUS (twice pinnate). Stem erect, furrowed, with spreading branches, 2 feet high. Leaves opposite, pinnately divided into thread-like segments. Flower-heads, solitary, 2 inches across; rays reddish purple, disk pale yellow; July and August. Introduced 1799.

C. DIVERSIFOLIUS (differing - leaved). A dwarf perennial with tuberous roots and Dahlia-like, but variable leaves. Flower-heads varying from blackish purple to red-purple, disk-florets and ray-florets of the same colour; July and August. Introduced 1862.

C. SCABIOSOIDES (Scabious - like). Tuberous - rooted perennial. Stems downy, 3 to 4 feet high. Leaves bristly beneath; leaflets five lance-shaped, toothed. Flower-heads scarlet; October. Introduced 1834.

C. TENUIFOLIUS (slender-leaved). Stems 1 to 2 feet high. Leaves finely-divided, Fennel-li' . Flower-heads rich dark purple; September and October. Annual.

Cultivation.

Cosmos requires similar treatment to *Dahlias*. The annual species are grown from seed sown in gentle heat in March; and the perennials propagated by cuttings or divisions of the tubers, which are stored and started into growth precisely as recommended for *Dahlia*.

Description of Plate 142.

Portion of stem of *Cosmos bipinnatus* with leaves and flower-heads. Fig. 1 is a section through the head, natural size; 2, a ray-floret; 3, a disk-floret; 4, the fruit, natural size and enlarged; 5, a seedling.

MARIGOLDS

Natural Order COMPOSITÆ. Genus *Tagetes*.

TAGETES (classical, derived from Tages, an Etruscan deity). A genus including about twenty species of annual herbs, with pinnately divided (rarely simple), opposite leaves. The flower-heads are always yellow or orange in the natural forms, the ray-florets in a single series, normally five in number; disk-florets tubular; involucre of one series

YOUTH AND AGE

(ZINNIA ELEGANS, *vars.*)

Nat. size

PL. 136

of bracts. The florets persist until the slender fruits are mature. Most of the species give out a very unpleasant odour. They are all natives of the warmer regions of America. In cultivation they are known as French, African, and Mexican Marigolds, when in truth they are all Mexican. They have been in cultivation in this country for a very long period, *Tagetes patula*, the French Marigold, having been introduced so far back as 1573, and *T. erecta*, the African Marigold, having just completed its third century in our gardens. *T. signata*, the Mexican Marigold, and the charming little *T. lucida*, introduced respectively in 1797 and 1798, are quite modern in comparison. The disk-florets under cultivation have mostly become rays, thus giving the heads that full, "double," and globular form so much appreciated by gardeners.

Principal Species.

TAGETES ERECTA (erect). Stems erect, branched, 2 feet high. Leaves much divided pinnately, the segments lance-shaped, saw-toothed. Flower-heads solitary, involucre somewhat angular, stalk gradually thickened upwards; florets citron-yellow; July. Annual.

T. LUCIDA (shining). Stem erect, slightly branched, 1 foot high. Leaves simple, lance-shaped, coarsely saw-toothed. Flower-heads three-quarters of an inch across, rich yellow, in corymbs, fragrant; ray-florets usually four, broad; disk-florets small; entire head having appearance of a Cruciferous flower; August. Perennial, but usually grown as an annual. Suitable for edgings.

T. PATULA (spreading). Stems erect, branches spreading, 1½ foot high. Leaves dissected pinnately, segments narrow-lance-shaped, saw-toothed. Flower-heads golden brown, 1½ inch across; August.

T. SIGNATA (distinct). Stems erect, branched, 1½ foot high. Leaves dissected pinnately, segments lance-shaped, with deeply-cut teeth. Flower-heads deep yellow, small (1¼ inch), but very numerous, produced in succession from July to October. The var. *pumila* is of more compact, dwarf habit.

T. TENUIFOLIA (slender-leaved). Stems erect, slightly branched, 2 feet high. Leaves dissected pinnately, the segments very narrow and coarsely toothed. Flower-heads yellow, ray-florets nearly round; August. Annual.

Cultivation.

The species of *Tagetes* are half-hardy, and come readily from seed sown in a frame. *T. lucida* may also be increased by means of cuttings taken in spring or autumn. The seeds of the annuals should be sown in April; those of *T. lucida*, if it is to be grown as a perennial, should be sown in August or September, and the young plants kept in a frame or greenhouse during the winter. *T. erecta* should be planted out at distances of a foot apart; the others at about nine inches apart. They thrive in most soils, but one that is moderately rich as well as light suits them best.

They can stand much sun, and *T. tenuifolia* will thrive even in light, dry soils. *T. erecta* forms fine clumps for the border, whilst *T. patula* and *T. signata* are very suitable for bedding purposes,—the var. *pumila* of the latter makes a good and enduring edging. The perennials should be lifted in autumn, wintered in frames, and divided in spring.

Description of Plates 143 and 144.

Plate 143. A, *Tagetes patula*, the French Marigold: Fig. 1, section through flower-head; 2, a disk-floret with a tendency to become rayed; 3, normal disk-floret; 4, seedling. B, *T. signata*, the Mexican Marigold: Fig. 5, fruit, natural size; 6, ditto, enlarged; 7, a seedling.

Plate 144. *T. erecta*, the African Marigold, about two-thirds of the natural size. Fig. 1 represents one of the ray-florets detached, with the immature fruit at its base; 2 is a disk-floret.

CONE FLOWERS

Natural Order Compositæ. Genus *Rudbeckia*

Rudbeckia (named by Linnæus in honour of Professor Olaf Rudbec, a Swedish botanist, who died 1702). A genus comprising a couple of dozen North American herbs, with showy flower-heads of purple, violet, or yellow. The characters of the flower-head are—involucre half-round, the bracts in several series; disk conical; ray-florets strap-shaped, spreading, sometimes toothed at the apex. *Rudbeckia triloba* and *R. purpurea* have been cultivated in this country since 1699, but most of the species still grown have been introduced during the present century.

Principal Species.

Rudbeckia amplexicaulis (stem-clasping leaves). Stems 2 to 3 feet high. Flower-heads $2\frac{1}{2}$ inches across; rays orange-yellow, disk purple-brown; June to August. Annual. Introduced 1793.

R. grandiflora (large-flowered). Stem angular, branched, $3\frac{1}{2}$ feet high. Leaves oval or lance-shaped, rough, with slight rounded teeth. Flower-heads large; ray-florets yellow, drooping, 2 inches long; disk dark purple; September. Introduced 1830.

R. maxima (greatest). Stem 5 to 9 feet high. Leaves oval or oblong, sometimes slightly toothed, the lower ones 8 to 12 inches long. Flower-heads solitary, on long stalks; ray-florets pure yellow, 2 inches long, drooping; August. Perennial.

R. pinnata (pinnate-leaved). Stem 3 feet high. Leaves pinnately divided into from three to seven lance-shaped leaflets. Ray-florets light yellow, large, drooping; July. Perennial. Introduced 1803.

P. purpurea (purple). Stem rough, 3 feet high. Leaves oval-

SILVER-LEAVED SUNFLOWER

(HELIANTHUS ARGOPHYLLUS)

$^{2}/_{3}$ Nat. size

PL. 139

lance-shaped, slightly toothed. Flower-heads nearly 4 inches across; ray-florets drooping, reddish purple; disk dark brown; August and September. Perennial.

R. SPECIOSA (showy). Stem branching from below, 2 to 5 feet high. Leaves ovate or lance-shaped, coarsely toothed. Flower-heads 3 or 4 inches across; ray-florets orange, disk blackish purple; July to October. Perennial. Introduced 1821.

Cultivation. All the species named above are hardy, and such as will do well in ordinary garden soil. The annuals must be produced from seed sown in September or March. The perennial species may be raised in the same manner, or by dividing the roots in spring. Several of the perennials make very fine and handsome plants for the herbaceous border. They are also used in some gardens as summer bedding plants.

GAILLARDIAS

Natural Order COMPOSITÆ. Genus *Gaillardia*

GAILLARDIA (named by Fougère in honour of M. Gaillard de Marentonneau, a French botanist). A genus of showy herbs, comprising about eight species, with solitary yellow or purple flower-heads, 2 or 3 inches across. The ray-florets are often two-coloured, and end in from three to five teeth; sometimes flat, sometimes trumpet-shaped. The disk-florets are separated by bristles, and the fruits are crowned by a pappus of six to ten scales, each ending in an awn. The bracts of the involucre are in one or two series. When examined with a lens the hairs of the stems and leaves will be seen to be curiously jointed. The species are natives of North and Extra-tropical South America.

History. *Gaillardia pulchella*, the earliest cultivated species in this country, was introduced in 1787, from Carolina, under the name of *G. bicolor*. Its var. *picta*, in various forms, is most widely cultivated. *G. aristata* was introduced from the United States in 1812, and several of its varieties are garden favourites. Some of these (such as *grandiflora* and *maxima*) far surpass the species in their brilliance and size. Other garden varieties are probably hybrids between these two perennial species. *G. amblyodon* is an annual of recent (1873) introduction from Texas. They are all perfectly hardy, except in very exposed places.

Principal Species. GAILLARDIA AMBLYODON (blunt-toothed). Stems 2 to 3 feet high. Radical leaves somewhat spoon-shaped; stem-leaves half-clasping, oblong, coarsely toothed at upper end. Ray-florets spreading, blood-red, three-lobed; October. Annual.

G. ARISTATA (awned). Stems 20 inches high. Leaves lance-shaped, entire or slightly toothed. Flower-heads yellow, 2 inches across, the reddish styles in the disk-florets very prominent; August to October. Perennial.

G. PULCHELLA (neat). Stems 2 to 3 feet high. Leaves lance-shaped, with a few coarse teeth. Flower-heads 2 to 3 inches across; ray-florets crimson tipped with yellow. In the typical form these rays are flat and spreading, but in some of the garden forms they become funnel-shaped, as in our Plate 145. In others the disk-florets are similarly developed, so that the head bears a close resemblance to that of the *Scabious*. There is a corresponding variation in respect of colour, purple-brown, yellow, red being variously combined in these flowers.

Garden Varieties. The following brief selection of garden varieties (perennials) is given as a mere suggestive sample:—

George Kelway, large crimson, yellow-edged flowers.
James Kelway, very large, brilliant scarlet, yellow edge.
Lorenzo, maroon, yellow edged.
Magenta King, magenta edged with yellow.
Somerset, pure yellow, quilled.
Vivian Grey, yellow, very fine.
William Kelway, brilliant crimson, yellow edge, very large.

Cultivation. *Gaillardias* love a light rich soil. Planted in groups, either in bed or border, they produce fine masses of colour, with a long succession of blossom. They are also valuable for their supply of cut flowers. Propagation is effected by seeds, divisions, or cuttings. Seeds should be sown in February or March, and the pans placed in gentle heat. The perennials may be divided in spring. Cuttings succeed best if taken in spring or autumn, and even the annuals are increased by this method, with the object of getting better plants that flower earlier than those raised from seeds.

Description of Plate 145. Some forms of *Gaillardia pulchella*, var. *picta*. Fig. 1 is a section through the flower-head, and Fig. 2 enlarged florets from disk and ray.

CHRYSANTHEMUMS

Natural Order COMPOSITÆ. Genus *Chrysanthemum*

CHRYSANTHEMUM (Greek, *chrysos*, gold, and *anthemon*, a flower). An important genus comprising about eighty species of herbs and shrubs, with alternate or radical leaves, deeply toothed or cut. Flower-heads solitary or in corymbs. The involucre bell-shaped, composed of overlapping bracts with dry and translucent margins. The ray-florets are in one series only, strap-shaped, yellow or white, and all female. Those of the

COREOPSIS TINCTORIA

$^{2}/_{3}$ Nat. size

PL. 140

disk are tubular with four or five teeth at the mouth, and bisexual. The pappus is reduced to a membranous ring or absent altogether. The species are natives of Europe, Western Asia, and North Africa.

History.

There are three species of *Chrysanthemum* indigenous to Britain, though one of these, *C. Parthenium*, the Feverfew, is by some regarded as merely a naturalised alien. The others are *C. segetum*, the Corn Marigold, a beautiful pest of cornfields that is sometimes admitted into gardens; and *C. Leucanthemum*, the Ox-eye Daisy of meadows and hayfields on poor soils. Of the cultivated species, *C. coronarium*, the Garland Daisy, from the Mediterranean region, was the first to be introduced, so far back as 1629. *C. frutescens*, the Marguerite or Paris Daisy, was introduced from the Canaries seventy years later, and its extensive cultivation, especially in recent years, has resulted in many varieties. *C. carinatum*, the Tricolor Daisy, a very useful annual, came from North Africa in 1796; and a few years previously *C. sinense*, the important autumn-flowering Chrysanthemum proper, was introduced from China. The precise date is uncertain,—some authorities make it as early as 1764, others 1789 or 1790. Gardening works of the last century, however, do not notice it. The type is a small yellow-flowered plant of straggling habit, and has only been found truly wild in China. But the Chrysanthemum had been long cultivated by Chinese and Japanese gardeners before it was introduced into Europe, and many of the best varieties grown here are of Japanese or Chinese origin. In Japan the Chrysanthemum occupies the same position as a national flower as the Rose does with us. Nothing in horticulture is more remarkable as an example of how greatly a plant may be made to vary by cultivation and selection than the Chrysanthemum, the difference between the prototype and the thousands of varieties evolved from it being without parallel. The potentialities of the flower were unsuspected until about 1826, when Captain Bernet, of Toulouse, an amateur gardener, raised seedlings. The result was, he got varieties which showed the plant was worthy of the serious attention of horticulturists. About this date the var. *Indicum* was introduced from China, and also grown from seeds. The progeny of these two races were then crossed, and gave rise to many more varieties. Hemsley says this introduction of *Indicum* took place about 1835, but Loudon includes it as a species in his *Hortus Britannicus* (1830), and gives a list of forty-four garden varieties of Chrysanthemum named at that date. Still the general culture of the Chrysanthemum did not make rapid headway, though the annual exhibitions by Broome and Dale in the Inner and Middle Temple Gardens did much to popularise it, proving as they did the suitability of these plants for town gardens.

These exhibitions and the preparation of the plants for them, months in advance, are among the early recollections of the writer's boyhood. Up till 1862, all the varieties grown here had regular blossoms, but in that year Robert Fortune introduced the first of the ragged-flowered Japanese varieties that have since become so exceedingly popular, and have by intercrossing produced so many fine forms. The forty-four varieties given by Loudon little more than sixty years ago have increased to thousands, and the power of the species in this respect does not appear to have at all reached its limit. These varieties have now been arranged in distinct classes, whose characteristics are indicated by the names they bear (see Garden Varieties and Hybrids).

Principal Species. CHRYSANTHEMUM ARGENTEUM (silvery). Stems unbranched, 1 foot high. Leaves greyish, twice-pinnate, the leaflets entire. Flower-head solitary, white; July. Perennial. Introduced from Armenia (1731).

C. CARINATUM (keeled). Tricolor Daisy. Stems branching, 2 feet high. Leaves fleshy, glaucous, twice-pinnate. Flower-heads 1½ to 2 inches across; bracts of involucre keeled; disk-florets brown; ray-florets white with yellow base; August. Annual. The var. *Burridgeanum* (which is more popular than the type) has the ray-florets of varied tints crossed by a purplish bar and the disk of the same hue (see Plate 146).

C. CORONARIUM (garland). Garland Daisy. Stems branched, 3 to 4 feet high. Leaves deeply lobed in a bi-pinnate manner. Flower-heads numerous, yellow, 2 inches across; July to September. Annual. There is a so-called "double" variety with the florets all strap-shaped, closely overlapping.

C. FRUTESCENS (shrubby). Paris Daisy; Marguerite. Stem shrubby at base, much branched and forming a bush, 2 to 6 feet high, and of equal diameter. Leaves smooth, somewhat fleshy, deeply cut in a pinnate manner. Flower-head about 2 inches across; disk yellow, rays white; January to December. Perennial, but not quite hardy. Should be grown in pots and turned out only in summer. Valuable for cut flowers. The var. *chrysaster* has yellow rays, and is known as the Yellow Marguerite. Plate 147.

C. PRÆALTUM (very high). Golden Feather. Stems branched, 2 feet high. Leaves, soft, golden yellow, turning greenish after flowering. Flower-heads, small, white, in corymbs; July, August. Perennial. Introduced from the Caucasus (1840). Much used for edgings.

C. SEGETUM (cornfield). Stem slightly branched, 12 to 18 inches. Leaves deeply toothed and lobed; the lower ones stalked and cut pinnately; the upper stalkless, half-clasping the stem. Flower-heads

SINGLE DAHLIA

(DAHLIA VARIABILIS)

$^{2}/_{3}$ Nat. size

PL. 141

2 inches across, golden yellow; rays lobed at tips; June to September. Annual. The var. *grandiflorum* has larger flowers.

C. SINENSE (Chinese). Autumn Chrysanthemum. A straggling shrub about 3 feet high, with yellow flowers 1½ inch across, with distinct ray- and disk-florets. Cultivated kinds very variable in all respects. Stems, shrubby, branching, 3 to 6 feet high. Leaves thick, leathery, glaucous, with waved lobes and teeth. Flower-head varying in size and colour, from white, yellow, and lilac to deep red and mauve; October and November. Plates 148–150.

C. TCHIHATCHEWII (Tchihatcheff's). Stems trailing, plant 2 to 3 inches high. Leaves deeply incised, small. Flower-heads, white, a little more than 1 inch across. Perennial. Native of Siberia. Introduced 1869.

Garden Varieties of C. sinense.

I. SINGLE-FLOWERED. In this section the flower-heads are similar in arrangement to those of *C. carinatum*, having strap-shaped florets only at the circumference, whilst those of the disk remain short and tubular.

***Helianthus*, rich yellow.**
***Marie Therese Bergman*, white, dwarf.**
***Mary Anderson*, white, afterwards pink.**
***Miss Annie Holden*, a sport from *Mary Anderson* agreeing with it in all points except colour, which is canary-yellow.**
***Miss Cannell*, pure white.**
***Oceana*, blush.**
***Purity*, purest white.**
***Queen of the Yellows*, yellow.**
***Scarlet Gem*, scarlet.**
***The Echo*, terra-cotta, dwarf, bushy.**

II. INCURVED SECTION. Florets of the disk as well as of the ray strap-shaped, their tips curved towards the centre of the flower-head.

***Beau Ideal*, bright rose-pink.**
***Black Lotus*, very dark crimson.**
***Charles H. Curtis*, deep yellow, very large.**
***E. Forgeot*, purple-amaranth, under-sides silvery.**
***Gold Dust*, brilliant golden yellow.**
***Graphic*, enormous flower-heads, rosy mauve, under-side silvery**
***J. Agate*, pure white,**
***Jeanne d'Arc*, milky white.**
***John Machar*, brilliant deep yellow.**
***Leviathan*, violet amaranth.**
***Miss Bronna Foster*, deep rose.**
***Miss Elsie Teichmann*, pearly white,**
***M. Henri Jacotot*, flesh, striped with violet-carmine.**
***Mrs. P. Blair*, rose, with streaks of deeper tint.**
***Mrs. Smith Rylands*, golden yellow.**
***Owen's Crimson*, blooms 5 inches across.**
***Owen Thomas*, yellow, 8 inches across, late bloomer.**
***The Egyptian*, dark velvety red.**
***The Queen*, grand white.**
***Thos. H. Brown*, bright pink.**
***Wilfred Marshall*, lemon-yellow.**
***William Tunnington*, reddish chestnut, with dull gold tips, weak-grower.**

III. REFLEXED SECTION. Florets strap-shaped, curving outwards from the centre.

***Admiral Gervais*, pale lilac, tipped white.**
***Col. T. C. Bourne*, blood-red.**
***John Lightfoot*, blush, edged pink.**
***La Belle D'Alger*, blush, white, early flowering.**
***Lady Randolph*, amaranth-crimson, very dwarf.**
***Maria Louise*, white.**
***M. Benj. Giraud*, crimson-red, florets slashed.**
***Milky White*, opaque white.**

IV. ANEMONE-FLOWERED SECTION. Ray-florets alone strap-shaped; disk-florets tubular, in a dense cushion-like mass.

Bacchus, crimson.
Caledonia, white with lilac-mauve centre.
Emperor, blush, sulphur centre.
Mrs. Bassett, rosy and white.
Mrs. J. C. Salter, orange-buff.
Owen's Perfection, lilac tinged with gold.
Sam Joaquin, white with lemon centre.
Surprise, pink.

V. JAPANESE SECTION. Florets slender, irregular in size and standing out from head in all directions.

Brilliant, crimson.
Centaurea, deep orange-yellow, spidery.
Commandant Blusset, purple-amaranth.
Duchess of Wellington, deep yellow.
Duchess of York, soft light yellow.
Edmund Bevan, gold-bronze and chestnut.
Eva Knowles, reddish apricot.
M. Aug. de Lacvivier, bronzy red tipped with gold.
M. Panckoucke, golden yellow.
Mrs Jeremiah Colman, white.
Mrs. R. Filkins, clear yellow, florets forked into four or five tips.
President Borrel, rosy purple.
Silk Twist, rosy mauve and cream, florets twisted.
Souvenir de Madame G. Eynard, reddish chestnut, with twisted golden yellow tips.
Souvenir de Petite Amie, pure white.
Thos. Wilkins, deep chrome-yellow.
W. A. Fowler, rich golden yellow.
White Good Gracious, pure white.

VI. POMPON SECTION. Flower-heads small and numerous, florets short and broad, mostly reflexed.

Black Douglas, maroon.
Boule de Neige, white.
Eynsford Gem, magenta-purple.
Golden Mdlle. Marthe, clear yellow.
Golden Trevenna, yellow.
La Pureté, pure white.
Osiris, violet, tipped with yellow.
Snowdrop, pure white.
Souvenir de Jersey, deep rose.
St. Michael, rich yellow.

Propagation. The two or three annual species we have described are raised in the manner suggested for other hardy annuals, *i.e.* by sowing seed in pots in February or March, and giving the protection of frame or greenhouse; or by sowing out of doors in March or April. The perennials are also raised from seed where plants are wanted for hybridising; but for general purposes of increasing stock, cuttings, suckers, and divisions of the root are generally adopted. There is probably no other class of plants in which these methods can be carried out with more absolute confidence in the success of the operation. Almost any piece broken off at any time and carelessly thrust into the ground would produce a rooted plant; and when cuttings are taken with the ordinary care, and potted in autumn, winter, or spring, the percentage of failures is exceedingly low. The cuttings may be inserted singly in small pots filled with sandy soil, or pretty thickly in large pots. Where rapidity is desired, the pots should be plunged to the rims in a gentle

COSMOS BIPINNATUS

Nat. size

PL. 142

hot-bed; but they will root readily enough in a close frame. We prefer the plan of striking singly in thumb-pots, as the plants receive no check when repotted. The cuttings should be about 2 inches long, and taken from the suckers that start around the base of the main stem as soon as they are large enough.

After the flowers have died off a large number of suckers start from the old stool. These, when a couple of inches high, form the best cuttings, and some of them will be found to have formed roots. They will get on rapidly, and if the shoots are stopped a few times, will form fine bushy plants that will bear abundance of bloom. After taking off these suckers the old stool is thrown on the rubbish-heap. Should tall standards be required for exhibition purposes, the suckers must not be stopped.

Another method adopted where bushes are required is to cut down the old stem to about 6 inches soon after flowering, and in the new year to divide the stool with its suckers into from three to six portions, and plant these out at distances varying according to the object in view.

Cultivation.

Chrysanthemums are very hungry plants, and he who would produce fine flowers must feed his plants liberally. He can scarcely make the compost too rich for them. They are also thirsty plants, and require regular waterings, but every precaution must be adopted to prevent souring of the soil by the stagnation of any surplus water. The potting soil for young plants should consist of good rough loam two parts, well-rotted manure, of which cow-dung is an appreciable constituent, one part. To these ingredients should be added a little sand and a little soot, also a few crushed bones. The plants should not be allowed to become pot-bound, but should be shifted on into larger pots until an eight- or nine-inch pot has been reached. The new earth should be well rammed in at each potting. When the flower-buds are beginning to expand, liquid manure, or a dose of some patent or chemical manure, such as Clay's Fertiliser, or nitrate of soda, should be given periodically. When grown in the bed or border the soil should be enriched a little while before the plants are put in, mulching in hot dry weather, and feeding with liquid manure just before flowering. A good plan is to grow them three or four feet apart where they can obtain plenty of air and sunshine, carefully lift them without injuring the roots, late in September, and pot them. They should then be removed to a shaded greenhouse and kept close until quite re-established. They will then flower with vigour.

The specimens that are grown in pots from the beginning must be housed in cool frames or conservatories through the winter, gradually

hardened off in spring, and the pots turned out. To prevent the roots becoming dry the pots should be plunged in coal-ashes in a well-drained border, the aspect of which must depend upon the general character of the locality as regards normal temperature. If the neighbourhood is a cold one, give the plants a sunny position, but if in a mild district, place them where the aspect is eastern or western, and where they will not get continuous exposure to the midday sunshine. If a successful autumn show of large well-formed flower-heads is desired, the plants must now be carefully watched, and the least tendency towards flagging of the leaves must be checked by watering the roots. Mulching the surface of the soil in the pots with well-rotted manure will also prove beneficial, serving as it does the double purpose of keeping the roots cool and moist and feeding the plants.

The after-treatment of these pot-plants depends upon what is expected of them. To obtain tall exhibition standards with a few enormous blooms, the plants must be allowed to grow, trained to a stake, until the requisite height has been nearly attained. Then the main stem must be nipped and a more bushy head produced. As the flower-buds appear, if size is desired before number, only the central bud at the extremity of each shoot should be left, the others being nipped out. It is by this means that the extraordinary flower-heads exhibited in recent years have been obtained. Where a large number of medium flowers is desired for cutting or conservatory decoration, a more bushy form should be encouraged by stopping the main shoot early, and so producing several erect branches; these should in turn be stopped when they are a few inches long, and the process repeated with the newer shoots. It is not advisable, however, to continue this treatment after the middle of June, or the flowering will be prejudicially affected. When the flower-buds appear, however, they should be thinned out as early as possible. Here we have two antagonistic processes at work, for the stopping tends to increase the number of flowers at the expense of size and quality, but to some extent we rectify this tendency by thinning out the buds, and so getting only a reasonable quantity of medium-sized flower-heads. Stopping of the small-flowered Pompon section may be continued a month later than the date prescribed for the larger kinds.

The only reason for putting the pot-plants under glass in autumn is to protect the opening buds from the early frosts. Sudden changes of temperature are bad for them, and therefore it is better to bring them in before there is any fear of frost than to wait until there is considerable difference between the outside temperature and that of the cool house.

(*A*) FRENCH MARIGOLD (TAGETES PATULA)

(*B*) MEXICAN MARIGOLD (TAGETES SIGNATA)

$^{2}/_{3}$ Nat. size

PL. 143

Unless frost is feared the house must not be shut up during the day just after the plants have been admitted. Any change in the conditions surrounding them must be made gradually; all the air possible should be given, and the house kept cool.

A succession of bloom may be secured by a very simple arrangement. At the beginning of September select the most forward-looking pot-plants and place them in a row against a south wall; the remainder should be removed to a similar position before an east wall. The first batch should be placed under cover by the middle of October, and the second left by their east wall as long as it is safe to leave them outside, but not later than the middle of November. These will then come on in flower in succession to the first batch, and so ensure a good display for about a couple of months. Succession is also obtained by a selection of the varieties according to their time of flowering, beginning with the summer-flowering sorts such as *Précocité* and *Madame Desgranges*, and ending with the latest. A catalogue as supplied by dealers in Chrysanthemums is helpful in making a selection. The early-flowering varieties are now largely grown for borders and flower-beds, to which they are transferred from the nursery-ground in June or July.

The foregoing remarks apply particularly to the autumn-flowering species, with which the name Chrysanthemum in its popular sense is more particularly identified. A few words may be given to the others. *C. carinatum* will be found a very useful annual for the ornamentation of borders; also as a pot-plant. Well-grown it is one of the most beautiful of hardy annuals. It may be sown from March to May where it is to flower, or in a reserve bed, whence the young plants may be taken with balls of earth and planted in bed or border about the end of May. For pot-culture a few seeds should be sown in the pots and grown in cold greenhouse or frame, or, what is better, where the out-door seed-bed exists, a few sturdy plants may be taken from the bed and potted. It is well to pinch back the main shoot of pot-plants when they are about three inches high, to induce a more bushy growth. *C. coronarium* should be similarly treated.

C. frutescens is not quite hardy, and requires somewhat different treatment. It may be propagated by cuttings made from the extremities of the branches at any time during summer, and struck in a frame, or in the ground if covered with a bell-glass. It is mostly used out of doors for filling garden vases and window-boxes; also as a source of supply for cut blossoms. Like the *Pelargoniums*, this plant may be induced to produce flowers all the year round by a little care in the treatment.

Description of Plates 146 to 150.

Plate 146. *Chrysanthemum carinatum*, var. *burridgeanum*, the Tricolor Daisy. Fig. 1 is a section of the flower-head; 2, an enlarged ray-floret; 3, an enlarged disk-floret; 4, a seedling.

Plate 147. *C. frutescens*, the Marguerite or Paris Daisy. A is the type, B the var. *chrysaster*. Fig. 1, a section through the flower-head; 2, an enlarged ray-floret; 3, an enlarged disk-floret.

Plate 148. *C. sinense*, cultivated varieties of the Japanese section, showing variations in form and colour of the florets. Fig. 4 is a quilled Japanese. Reduced to about two-thirds of the natural size.

Plate 149. *C. sinense*, further varieties. Figs. 7 and 12 are Incurved; 8, Incurved Japanese; 9, Anemone-flowered; 10, a fimbriated Pompon. Reduced to about two-thirds natural size.

Plate 150. *C. sinense*, a Pompon var., *Mont d'Or*. Reduced to two-thirds natural size.

PYRETHRUMS

Natural Order COMPOSITÆ. Genus *Pyrethrum*

PYRETHRUM (from the classical Greek name for the plants, *Pyrethron*). A genus united with *Chrysanthemum* by most authors, and under which genus we have already described several species formerly considered as Pyrethrums. We have retained the distinction here because there is now a considerable number of florists' varieties known as "Double Pyrethrums," and to group them under Chrysanthemums is calculated to cause much confusion. The chief characters by which *Pyrethrum* is distinguished from *Chrysanthemum* consist in the fruits being without wings, and the possession of a pappus, which, however, takes the form of a mere membranous border, raised above the fruit and sometimes indented all round (see Plate 151, Fig. 1).

The popular bedding plant known as Golden Pyrethrum, Feverfew, or Golden Feather is described under *Chrysanthemum præaltum*.

The only species we propose to treat separately is—

Species.

PYRETHRUM ROSEUM (rosy). A perennial with stems 2 feet high, well clothed with pinnately-lobed leaves, which are again deeply cut, much resembling those of Milfoil, and of a bright green. The flower-heads are a couple of inches across, with yellow disk; the ray-florets rose-coloured; May and June. Introduced from the Caucasus (1804). The flower-heads are said to form a principal

AFRICAN MARIGOLD

(TAGETES ERECTA)

$^{2}/_{3}$ Nat. size

PL. 144

ingredient in the manufacture of Persian Insect-powder. (Dalmatian Insect-powder is furnished by a closely-allied species, viz. *P. cinerariæfolium*.) Under cultivation it has run into a very large number of forms varying in size and colour, and dignified with florists' names. A few of these are shown in Plate 151. The following is a short list of "single" and "double" varieties, designed to give wide range of colour:—

SINGLES.

Adrastes, light purple with deeper lines.
Ayrshire, crimson.
Beatrice Kelway, cherry-rose.
Caprius, rich purple.
Captain Strachan, clear pink, very large.
Duke of Connaught, carmine.
Ethel, white tinged with rose.
Mary Anderson, flesh.
Mathilda, pure white.
Mrs. Bateman Brown, carmine-crimson, very large.
Tasso, bright vermilion.
Utica, purplish rose.
Valentia, very pale pink.

DOUBLES.

Aphrodite, pure white.
Empress Queen, blush.
King Oscar, crimson-scarlet.
Leonard Kelway, rose.
Lischen, lilac-rose with orange disk.
Melton, deep crimson-magenta.
Miss Plinkie, purplish crimson, lilac-orange disk.
Nancy, dwarf, blush white, yellow disk.
Pericles, peach, golden disk.
Princess de Metternich, white, orange disk.
Rubrum plenum, rosy lilac, quilled.
Wega, yellowish pink.

Cultivation. *P. roseum* is one of the most useful plants for the gardener, owing to the highly ornamental character of its flowers and foliage, its adaptability alike for beds, borders, vases, pots, or for cutting purposes. It likes a rich deep soil, well manured, and must have plenty of water in dry weather; this is an important item in its treatment, for if neglected the flowering period will be a short one, whilst given liberal waterings the plants will continue to bloom right on through summer and autumn. Propagation is chiefly effected by division of the roots. The instructions for cultivation given under the head of *Chrysanthemum* apply generally to these plants, except that allowance must be made for their more herbaceous character.

Description of Plate 151. *Pyrethrum roseum*, showing colour and form-variation of the garden or "double" kinds. Fig. 1 is a ray-floret; 2, a disk-floret of the natural form; 3, a disk-floret of one of the improved forms.

MILFOILS

Natural Order COMPOSITÆ. Genus *Achillea*

ACHILLEA (named after Achilles, who was thought by the ancients to have discovered medicinal virtues in the plant, and with it to have cured the

wounds of his soldiers). A genus of about eighty perennial herbs with alternate leaves, and small flower-heads arranged in flat corymbs. Ray-florets few, female; broad, white, yellow, or purple. The bracts of the involucre are oblong, with the margins often dry, translucent and discoloured; the disk is covered with chaffy scales. The florets of the disk are somewhat compressed, tubular, five-toothed, bisexual. The fruit is oblong, compressed, without a pappus. The species are natives of Europe, North Asia, and North America. Two are common indigenous weeds in Britain,—*Achillea Ptarmica* and *A. Millefolium*,—and of these cultivated forms are found in gardens. In the wild state they have been much used in former times as a snuff-plant or Sneezewort and a Woundwort respectively. Several of the exotic species have been in our gardens for very long periods. The pretty alpine *A. atrata* was introduced from Austria three hundred years ago. *A. ægyptica*, from the Levant, and *A. Herba-rota*, from France, both date their settlement among us from the year 1640, and *A. Clavenna* only comes sixteen years behind them.

Principal Species. ACHILLEA ÆGYPTICA (Egyptian). Stems 2 to 2½ feet high. Leaves silvery, pinnate, with lance-shaped, saw-toothed leaflets. Flower-heads bright yellow; corymbs 3 or 4 inches across; June to August.

A. AGERATUM (Ageratum-like). Flower-stems ½-foot high. Leaves radical, slender, silvery, with crimped edges, in a rosette. Flower-heads pure white, large; July. Native of Europe. Introduced 1570.

A. ARGENTEA (silvery). Plant tufted, an inch high, spreading. Leaves narrow, pinnately lobed, covered with long white hairs. Flower-heads white: March.

A. AUREA (golden). Plant tufted. Flower-stems 1½ foot high. Flower-heads golden yellow; July to September. Introduced from the Levant (1739).

A. CLAVENNÆ (Clavenna's). Plant tufted, hoary, 6 to 10 inches high. Leaves deeply cut in bi-pinnate fashion. Flower-heads white, in corymbs; May to July. Native of Europe.

A. EUPATORIUM (Eupatorium-like). Stems 4 or 5 feet high. Leaves bi-pinnate, segments narrow, rough with hairs. Flower-heads brilliant yellow massed in corymbs, 4 or 5 inches across; June to September. Introduced from the Caucasus (1803).

A. MILLEFOLIUM (thousand-leaved). Yarrow or Milfoil. Rootstock creeping. Stems furrowed, 6 to 18 inches high. Leaves divided thrice-pinnately, the segments exceedingly slender and crowded. Flower-heads numerous, ¼-inch across, in corymbs 1½ inch across; white, pink, or

GAILLARDIA PULCHELLA, *var. picta*

Nat. size

PL. 145

purple; May to September. Native. The form generally grown in gardens is the var *roseum* with rosy bloom.

A. MONGOLICA (Mongolian). Stems 12 to 18 inches high. Leaves simple. Flower-heads white; July. Introduced from Siberia (1818).

A. PTARMICA (for sneezing). Sneezewort. Rootstock creeping. Stem, 1 to 2 feet, ribbed, slightly branched. Leaves narrow, simple, slightly toothed. Flower-heads white, few in a corymb; July to September. Native. The cultivated var. is the *flore-pleno*.

A. SERRATA (saw-toothed). Stems 1 foot high. Leaves lance-shaped, saw-toothed, white with hairs. Flower-heads large, white, in panicled corymbs; June to August. Introduced from Switzerland (1686). The garden form is the var. *flore-pleno*.

A. TOMENTOSA (woolly). Stems 8 to 12 inches high. Leaves woolly, cut deeply into very slender segments, bi-pinnately. Flower-heads bright yellow, in compound corymbs; June to August. Native of Europe and North Africa.

A. UMBELLATA (umbelled). Stems 4 or 5 inches high. Leaves cut into oval lobes, silvery white. Flower-heads white, few, in umbel-like corymbs. Native of Greece; cultivated as a rock-plant chiefly on account of the silvery foliage.

Cultivation. All the species mentioned are hardy perennials, and may be successfully grown in ordinary garden soils. Some of them make excellent border plants on account of the continuous flowering period and neat habit. They are also useful for the purpose of cutting the flowers. Tall-growing species like *A. Eupatorium* find their appropriate place at the rear of the border; whilst several of the dwarf-forms may be used as edgings to bed or border, or to form little clumps in the rock-garden. Propagation may be effected by sowing the seed as soon as ripe, by taking cuttings, or by dividing the rootstock, operations which should be carried out in spring. *A. ægyptica* and *A. aurea* should be given a sunny position.

LEOPARD'S-BANES

Natural Order COMPOSITÆ. Genus *Doronicum*

DORONICUM (meaning of name doubtful, but said to be derived from *doronigi*, an Arabic name). A genus containing only about ten species of herbaceous perennials with creeping or tuberous rootstocks. The radical leaves are stalked; those of the stem are stalkless, stem-clasping

and alternate. The flower-heads are solitary or in corymbs, entirely yellow; bracts of involucre in a few series, long and slender. Ray-florets strap-shaped, usually female; disk-florets tubular, with dilated five-toothed mouth, bisexual. Fruit oblong, furrowed; pappus-hairs of the disk-fruits in many series, those of the ray-fruits few or none. The species are natives of Europe, Northern Asia, and the mountain regions of India; two are naturalised in British plantations.

History. The Leopard's-banes are of ancient cultivation in this country, but the date at which one of the two naturalised species—*Doronicum Pardalianches*—was introduced is not known; until comparatively recently they were regarded as indigenous. This species got its specific name, and the genus its popular name, from the ancient belief that though good for certain human ailments it was rapidly fatal to leopards and other wild beasts if the root or leaves were mixed with meat and strewed around in their haunts. *Pardalianches* signifies leopard-strangler. *D. plantagineum*, the other naturalised species, was introduced from Southern Europe about 1570. *D. altaicum*, a native of Siberia, was introduced in 1738, and *D. caucasicum*, from the Caucasus, in 1815, followed a year later by *D. austriacum* from Austria.

Principal Species. DORONICUM ALTAICUM (native of the Altai). Stem 1 foot high. Radical leaves oval-spoon-shaped; stem-leaves oval, toothed, stem-clasping. Flower-heads yellow; July.

D. AUSTRIACUM (Austrian). Stem 12 to 18 inches Radical leaves heart-shaped, toothed, stalked; lower stem-leaves oval-spoon-shaped, abruptly narrowed at base; upper ones lance-shaped, somewhat heart-shaped at base, clasping the stem. Flower-heads large, yellow, one to five on each stem; April to June.

D. CAUCASICUM (Caucasian). Stem 1 to 2 feet high. Radical leaves broad-heart-shaped, edges deeply toothed; stem-leaves oval, toothed, with broad clasping base. Flower-heads, 2 inches or more across, yellow; May to August. Plate 152.

D. PARDALIANCHES (Leopard-strangler). Great Leopard's-bane. Stem 2 to 3 feet. Radical leaves heart-shaped, with long stalks; stem-leaves oval, the lower with expanded stem-clasping footstalks, the upper stalkless. Flower-heads three to five, yellow, 2 inches or less across; May to July. Whole plant downy and hairy.

D. PLANTAGINEUM (Plantain-leaved). Similar to the last, but smoother and more slender; leaves not heart-shaped, but more nearly lance-shaped, three-to five-ribbed; upper ones oblong; radical leaves oval. Flower-heads yellow, usually solitary; June and July. The form mostly grown in gardens is the var. *Excelsum*, a taller (5 feet), more elegant,

CHRYSANTHEMUM CARINATUM

Nat. size

PL. 146

and robust plant than the type, with larger flower-heads (3 to 4 inches across), flowering as early as March and continuing in bloom till October.

Cultivation. *Doronicums* succeed in most garden soils, and need no special attention. They are very hardy, and may therefore be placed in any situation. Owing to their habit of blossoming at a time when garden flowers are not too abundant they are a very desirable genus to cultivate, and may be used not only for beds and borders, but also for filling vases, and for pot-culture. If the heads are cut off as soon as they begin to fade, a succession of fresh flowers will be maintained for a long time. The plants are usually propagated by dividing the rootstock, which should be done in February or March. The separated pieces should each have roots, and they may then be planted out direct into the border, where they will soon become established and flower freely the same spring. *D. plantagineum* and its varieties are worth a place among plants grown in pots to flower in the conservatory in early spring.

Description of Plate 152. *Doronicum caucasicum*, the Caucasian Leopard's-bane: radical leaf and upper portion of flowering plant. Fig. 1 is an enlargement of a ray-floret; 2, a disk-floret on a similar scale.

CINERARIAS AND RAGWEEDS

Natural Order Compositæ. Genus *Senecio*

Senecio (Latin, *senex*, an old man, suggested by the silvery-white pappus-hairs or by the baldness of the disk). An enormous genus (nearly nine hundred species) of plants including shrubs and herbs, hardy and tender, annual and perennial. The leaves are radical or alternate, entire, toothed, lobed, or considerably dissected. The flower-heads are solitary or in corymbs; the bracts of the involucre in one series. Ray-florets strap-shaped in one series, variously coloured, female, sometimes not present; disk-florets tubular, dilated towards the mouth, five-toothed, bisexual. Pappus-hairs in many series, slender and soft. The species are distributed throughout all temperate and cold climates.

History. The name Cineraria applies strictly only to a small section of the genus, the *Senecios* proper being known as Ragworts and Groundsels. A considerable number of species are known in gardens, though not very commonly cultivated. We give descriptions of several species, but our cultural directions apply more to the species which are horticulturally regarded as Cinerarias. These are the progeny

chiefly of *Senecio cruentus*, a species that was introduced from the Canaries in 1777, and has since been greatly improved. Considerable advance was made by the production, in the year 1842, of Webber's Cineraria, a garden seedling with bright blue flower-heads. Judged by present standards the ray-florets of this were too narrow, and it has given way to varieties with the ray-florets so broad or so nunerous that they overlap. Then there are the so-called "double" varieties in which all the florets are strap-shaped. These are chiefly in request for cut flowers and button-holes. Prior to the introduction of *S. cruentus* the only Cineraria in cultivation was *S. maritima*, with yellow flower-heads and finely-cut silvery foliage, introduced from the Mediterranean region in 1633, but this was not extensively grown until recently.

Principal Species.

SENECIO AURANTIACA (orange). Stem woolly, unbranched, 9 inches high. Radical leaves elliptic with slightly scalloped edges; stem-leaves lance-shaped, with entire edges. Flower-heads orange, in corymbs; May. Herbaceous perennial. Native of Europe. **Introduced 1819.**

S. CRUENTUS (bloody, referring to the purple under-side of the leaf). Stem 2 feet high. Radical leaves heart-shaped, lobed; stem-leaves oval, stem clasping. Flower-heads reddish purple; spring and summer. Greenhouse perennial. Plate 153.

S. DORONICUM (Doronicum-like). Stems 1 foot high. Radical leaves lance-shaped or narrow-heart-shaped, thick, toothed, stalked; stem-leaves somewhat elliptic. Flower-heads yellow, 2 inches across; July to September. Introduced from Southern Europe (1705). The var. *hosmariensis* is a pretty dwarf, 4 or 5 inches high, suitable for rockwork.

S. ELEGANS (elegant). American Groundsel. Stem erect, branched, 1 to 2 feet high. Leaves fleshy, irregularly cut, as though the edges had been nibbled. Flower-heads small, in corymbs at end of branches; ray-florets purple, disk-florets yellow; June to August. There are "double" varieties with white, pink, crimson, or purple flower-heads. A South African (half-hardy) biennial, introduced 1700.

S. L'HERITIERI (L'Heritier's). Stems numerous, perennial, 2 to 4 feet, zigzag. Leaves heart-shaped, toothed, covered with silk-like wool. Flowers, in large, loose terminal corymbs, white tipped with carmine, very fragrant. Native of the Canaries. One of the best of winter-flowering pot-plants for the conservatory.

S. MACROGLOSSUS (long-tongued). A greenhouse climber, with shining ivy-like leaves and large yellow flower-heads similar to those of the Yellow Marguerite, produced in winter. Often called Cape Ivy. Introduced from South Africa (1885).

MARGUERITE OR PARIS DAISY

(*A*) *White:* CHRYSANTHEMUM FRUTESCENS

(*B*) *Yellow:* CHRYSANTHEMUM FRUTESCENS—*var. chrysaster*

⅔ Nat. size

PL. 147

S. MACROPHYLLUS (large-leaved). Stems stout, woody, erect, 6 to 8 feet high. Leaves large, oblong, toothed. Flowers yellow, in enormous corymbs often 2 feet across. A noble plant for the conservatory, flowering in winter. Also known as *S. Ghiesbreghtii.* Native of Mexico.

S. MARITIMA (maritime). Stem 2 feet high. Leaves tufted, covered with silvery down, pinnately cut, the segments about three-lobed. Flower-heads yellow, in a panicle; July to September. Extensively employed in summer bedding on account of the decorative qualities of its silvery leaves. The var. *variegata* is a recent introduction remarkable for its pretty yellow variegation. Useful as a pot-plant. The var. *acanthifolia* has broader leaves. Hardy perennial.

S. PULCHER (pretty). Stem 1 to 2 feet high. Radical leaves oblong-lance-shaped, round-toothed, stalked; stem-leaves more slender, half-clasping the stem. Flower-heads large, in terminal cluster; ray-florets purple, about twenty in number; disk-florets yellow; June to October. Whole plant covered with cobweb-like woolliness. Hardy perennial. Introduced from Uruguay (1872).

S. SAGITTIFOLIUS (arrow-head leaves). Stems 2 to 6 feet high. Leaves, 3 feet long, of arrow-head pattern, silvery green. Flower-heads large, white, somewhat resembling Marguerites, in corymbs; July to September. A biennial (native of Uruguay), requiring protection of a cold greenhouse in winter.

Cultivation. Most of the species succeed in loamy soils, and the hardy ones will be found very useful for borders. They may all be raised easily from seed sown under glass in July and August. The perennial kinds may also be propagated by means of cuttings. Where it is desired to get a stock of particular named varieties, this method must be pursued; otherwise it will be found better to raise from seed and select the best of the young plants. Another plan is to cut down the plants after flowering, and so induce them to throw up several suckers. About March shake them out of the pots, separate the suckers, which will be well provided with roots, and pot separately. As seed-sowing is the most popular method of raising Cinerarias for greenhouse and conservatory decoration, we will give attention to that, for by a little management we can by this means have plants flowering the greater part of the year. In sowing the seed we should remember that a seedling will flower when it is about six months old. This fact kept in mind, we can sow for a succession of bloom. The best compost for the seed-pans may be prepared of equal parts of fine leaf-mould and fresh loam, to which a little sharp sand should be added. See to the drainage, and finish off with a fine smooth surface, upon which the seeds

should be thinly sprinkled and kept in place by a fine sifting of the compost. The whole should then be very carefully moistened by the spray from a fine rose, the pan covered with glass and placed in a shady corner of the greenhouse or cold frame. When the young plants appear raise the glass to give air, and gradually remove it. Give plenty of light also, but shade from bright sunshine. As soon as they may be handled safely, prick off into other pans, or pot singly in three-inch pots, still keeping them in the house and in the shade until they are thoroughly established. Then give more air, and so gradually harden that they may be turned outside in a sheltered position with a northern aspect; or they may be placed in a cold frame or pit on a bottom of coal-ashes.

The potting mixture should be a compost of rich loam, leaf-mould, and well-rotted sheep- or cow-manure in equal portions, with sharp sand added, and used in rather a rough condition. In this they must be regularly potted on so that they receive no check. For small plants five-inch pots are large enough, but if large ones are desired they may have a few further shifts until they come into seven- or eight-inch pots. To obtain these large specimens the first-formed flowering stem must be cut out close to the base, and a number of side-shoots thus induced, which, if too numerous, may be reduced. Give plenty of water and syringe the foliage in summer. Give plenty of light, but screen from the direct rays of the sun. When the flower-buds appear give rich manure-water, and continue to do so until the flowers are well out.

Description of Plate 153. One of the many florists' varieties of *Senecio cruentus*, showing the upper leaves and the flowers. Fig. 1 is a section through the flower-head; 2, an enlarged unopened floret from the disk; 3, the same expanded; and 4, in section.

CACALIA

Natural Order COMPOSITÆ. Genus *Emilia*

EMILIA (commemorative name). A few species of herbs formerly included in the genus *Cacalia*, which is now incorporated with *Senecio*, but still known in gardens as Cacalias. The distinguishing character of the group is found in the florets, all of which are tubular, with five elongated teeth. The five-sided fruits are fringed with hair at the angles and crowned with a pappus consisting of many rows of fine long hairs. The bracts of the involucre are in a single series, erect.

CHRYSANTHEMUMS

(CHRYSANTHEMUM SINENSE, *vars.*)

Reduced

PL. 148

Principal Species. EMILIA SAGITTATA (arrow-headed). Stem 1½ foot high. Radical leaves oval, with heart-shaped or arrow-head-shaped base; stem-leaves alternate, more lance-shaped, half-clasping the stem, coarsely toothed. Flower-heads, scarlet or orange, in clusters of from three to seven at the ends of the branches; June to September. An annual. Natives of India and the Philippines. Introduced 1799.

Cultivation. The directions given for the culture of the annual species of *Senecio* will apply generally to *Emilia*. They are raised from seed, of course, and this should be sown in April or May where the plants are to flower, or in a seed-bed, whence the seedlings are pricked out in permanent positions as soon as they are large enough to handle. Their flower-heads, though individually rather small, are rendered conspicuous by their brilliant colouring.

Description of Plate 145. *Emilia sagittata*, the Scarlet Cacalia: upper portions of two plants. A with orange, B with scarlet flowers. Figs. 1 A and 2 B are sections through the flower-heads of these two varieties; 3 A and 4 B are individual florets from each, whilst 5 is the fruit and its pappus crown, and 6 a seedling.

MARIGOLDS

Natural Order COMPOSITÆ. Genus *Calendula*

CALENDULA (Latin, *calendæ*, the first day of each month; in allusion to its almost perpetual flowering). A genus of about twenty species of greenhouse and hardy annuals and perennials, distinguished by the disk being nearly flat and devoid of scales: the involucre formed of one or two series of bracts usually with dry, translucent edges; the ray-florets strap-shaped, in two or three series, female; the disk-florets tubular, male; the fruit curved and without pappus. Natives chiefly of the Mediterranean region.

History. The Common or Pot Marigold (*Calendula officinalis*) was introduced to Britain from Southern Europe in 1573, about the same time that the African and French Marigolds were being made known here. *Calendula*, however, was grown not only for its freely-produced orange flower-heads, but because they were useful as a flavouring in soups and also to give these a fine colour. They were similarly used to colour cheese. It has taken kindly to English soil, and has a way of taking possession of a garden, unless it is closely watched, and its flower-heads plucked before they can ripen their seeds. Many a

neglected garden is almost entirely occupied by this plant. In cultivated ground it has produced several varieties, but they are rather despised by good gardeners and florists as plants that are really too independent to be tolerated in select enclosures.

Principal Species. CALENDULA OFFICINALIS (sold in shops). Stems 20 inches high. Leaves spoon-shaped. Flower-heads orange, 2 inches across: June to September. Fruits boat-shaped, incurved, the back rough with little points (*muricated*). Whole plant sticky, and giving out an aromatic odour. There are varieties with very pale yellow heads; with a darker disk; with the disk-florets all or nearly all developed into strap-shape; with the rays streaked with orange and salmon; or bordered with purple-brown. The most distinct form is proliferous, and mimics on a large scale the Hen-and-Chickens Daisy already mentioned under *Bellis*. As in that genus, the Mother Marigold (*C. officinalis*, var. *prolifera*) is distinguished by having seven or eight branches from the involucre, each ending in a small Marigold flower-head.

Cultivation. *C. officinalis* will succeed in any soil or situation, but if grown at all the best should be got out of it, and to this end seed should be sown in March or April on a seed-bed in the open air. When the young plants are about 3 inches high, they should be planted out at distances of a foot apart, in rather rich, light, loamy soil. They will be kept in bounds and the size and quality of the heads improved by picking these off as soon as they have passed their prime. The blooming period, too, will be much prolonged by this treatment. Of course, for the purpose of sowing seed for the following year, a plant with fine flowers may be allowed to seed, but the heads must be watched and gathered as soon as ripe.

Description of Plate 155. *Calendula officinalis*, upper portion of a plant, natural size. Fig. 1 is a section through a flower-head; 2, a ray-floret; 3, a fruit; 4, a seedling.

GAZANIAS

Natural Order COMPOSITÆ. Genus *Gazania*

GAZANIA (derived from the Greek, *gaza*, riches, in allusion to brilliant flowers; or named in honour of Theodore Gaza, a translator of Theophrastus' botanical works, 1393–1478). A genus containing about twenty-four species of showy herbs. They are characterised by the

CHRYSANTHEMUMS

(CHRYSANTHEMUM SINENSE, *vars.*)

Reduced

PL. 149

bracts of the involucre cohering for the greater part of their length, so as to form a cup. The yellow ray-florets are strap-shaped, without either stamens or pistils, whilst the usually darker, tubular, disk-florets contain both. The fruits are clothed with silky hairs, under which the delicate pappus-hairs are almost hidden. The leaves are radical or alternate, simple or cut pinnately; they are glossy green above and white beneath. The species are natives of South Africa.

History. *Gazanias* are wayside weeds in South Africa, where they produce brilliant displays in direct sunshine. Like *Calandrinia*, the flowers will not expand unless the sun is shining, and this fact may be borne in mind by those who would grow them in places getting but short periods of sunshine. *Gazania rigens* was the species first to be introduced (1755), followed in 1804 by *G. pavonia* and in 1816 by *G. uniflora*. By the crossing of *G. rigens* and *G. uniflora* several hybrids have been obtained, and it is supposed that *G. splendens*, the most generally cultivated form, is one of them.

Principal Species. GAZANIA PAVONIA (peacock). Stemless, 1½ foot high. Leaves hairy, cut into slender pinnate segments. Flower-heads about 3 inches across; ray-florets orange, with a large brown spot at the base, tinged with green and having a white centre. This is the peacock-like ornament that has suggested the name. The disk is darker. It flowers in June and July.

G. RIGENS (stiff). Stem 1 foot high, erect. Leaves hairy, slender, spoon-shaped. Flower-heads bright golden, with a velvety black band near the base of the rays; June to September.

G. SPLENDENS (glittering), Stem trailing, 1½ foot high. Leaves silky, slender, spoon-shaped, white beneath. Flower-heads, 2 to 3 inches across, orange; the rays with a brown patch, in the midst of which is a pearly white spot, disk-florets paler in colour than the rays; July to September. Origin uncertain; believed to be a hybrid. The var. *aurea* has golden variegated leaves, and the var. *variegata* has the leaves edged with white.

G. UNIFLORA (one-flowered). Stem shrubby, trailing, 1 foot high. Leaves downy beneath, something between spoon-shaped and lance-shaped. Flower-heads of one tint of yellow throughout; July and August.

Cultivation. Propagation of *Gazanias* is effected by means of cuttings, or by dividing the old plants. Cuttings are struck in summer, and the best material for the purpose will be found in the shoots that break from the base of the plant. If these are removed in July or August and inserted in pots of sandy soil, placed in a

close frame, they will root readily. They should afterwards be potted singly in a mixture of loam and peat, and kept in a cool greenhouse until the following summer, when they may be turned out of the pots into the open bed or border. They make admirable bedding plants for a summer display, but they need to be taken up in autumn, potted and stored in a cool greenhouse or frame during the winter. In other respects they will be found to need little care.

Description of Plate 156.

Gazania splendens, showing trailing habit, leaves, and flower-heads. Fig. 1 is a section through the flower-head; 2 and 3, ray- and disk-florets respectively.

SOME MINOR GENERA

Natural Order Compositæ

Several genera of Composite plants are represented in our gardens which the scope of the work has not allowed us to illustrate. Some of these may be referred to briefly in this place under the names of the genera to which they belong.

Vernonia (named in honour of Wm. Vernon, botanical explorer). Flower-heads without rays, the florets being all tubular and equal, five-cleft. The principal species horticulturally are *Vernonia noveboracensis*, a hardy perennial (North America, 1710) with purple flower-heads which appear in August; and *V. Calvoana*, a handsome stove shrub (Cameroons, 1861), which produces white flower-heads with purple centre in January. They require rich, light soil and are chiefly propagated by cuttings and divisions of the plant.

Stokesia (named in honour of Dr. Jonathan Stokes, 1755–1831). A single species genus consisting of *Stokesia cyanea*, Stokes' Aster, a native of Carolina, with large, terminal, blue flower-heads, produced in August and September. The stem is about 2 feet high, covered with cottony down, and the leaves are lance-shaped with a few spiny teeth at their base. It was introduced in 1766. It is a herbaceous perennial, requiring greenhouse treatment, but may be planted out in the open border during summer. Propagated by seeds or by division of the roots.

Pectis (Latin, *pecten*, a comb; from the form of the pappus). A genus of about forty herbs, of which only one is grown—*Pectis angustifolia*, a dwarf, branching, half-hardy annual, about 6 inches high, with fringed slender leaves, and fragrant yellow flower-heads. It was intro-

POMPON CHRYSANTHEMUM

(CHRYSANTHEMUM SINENSE, *var. Mont d'Or*)

$^{2}/_{3}$ Nat. size

PL. 150

duced from North-West America in 1865. Propagation by seed, sown in pots, and germinated in a warm frame.

STEVIA (named in honour of Professor Peter J. Esteve, of Valencia, sixteenth century). Florets all tubular, white or purplish, five-cleft, five in a head; heads in corymbs or panicles. Principal species: *Stevia Eupatoria* (1826) and *S. ovata* (1816), both with white flower-heads; *S. purpurea* (1812), with purple, and *S. serrata* (1827), with white or pink, flower-heads. These perennials from Mexico flower in August, and do well as border plants in summer, but in winter they require slight protection, such as a cool greenhouse or frame. They are propagated alike by seeds, cuttings, and divisions. By the use of seeds they may be treated as annuals, if sown on a hot-bed in March.

LIATRIS. Florets all tubular, long, with free slender extremities, white or purplish. Involucre cylindrical, the bracts closely overlapping. Flower-heads in spikes, racemes, or panicles. Principal species: *Liatris pycnostachya* (1732), with pale purple heads in dense spikes, over a foot long, and long slender leaves; *L. spicata* (1732), of smaller stature, with purple heads, in spikes from 6 inches to a foot long, and long lance-shaped leaves. These North American plants are perennials, but they are better treated as biennials, sowing the seeds in spring on light soil.

CHARIEIS (Greek, graceful, elegant). The only species is a hardy annual from the Cape, also known as *Kaulfussia amelloides*. *Charieis heterophylla* has oblong-lance-shaped leaves and flower-heads entirely blue, or with blue rays and yellow disk, flowering in June. It thrives in ordinary soil, and seed should be sown in April where intended to flower; or in March on heat. Introduced 1819.

ANTENNARIA (from resemblance between the antennæ or feelers of insects and the pappus of the male florets). Principally cultivated, on account of their silvery woolly leaves, for use as border edgings. Heads surrounded by numerous everlasting bracts, as long as the florets, and in several series. The male and female florets occur on different plants; the former are tubular, dilated at the mouth, the female thread-like. The principal species is *Antennaria margaritacea*, or Pearly Everlasting, a plant supposed to have been introduced from North America in the sixteenth century, but now naturalised in parts of Britain. Its branching stem is about 2 feet high, clothed with leaves, the under-side of which is white with dense cotton. Heads one-third of an inch across, white, in compound corymbs; July and August. *A. tomentosa* is an exceedingly dwarf species, not more than an inch high. The flower-heads are dried as soon

as fully expanded, dyed various colours, and used for decorative purposes. They will grow in almost any soil, and are easily propagated by dividing the roots; or they may be grown from seed.

PODOLEPIS (Greek, *pous*, a foot, and *lepis*, a scale; from the bracts at the top of the footstalk). Another group of Everlastings, so far as the involucres are concerned. The ray-florets are strap-shaped in a single series. The flowering plant somewhat resembles *Acroclinium roseum*. The two best-known species are: *Podolepis aristata*, with the bracts ending in a bristle-point, and golden disks with small pink rays; July; annual. *P. gracilis* is a more delicate perennial species with purple, lilac, or white heads; August; should be grown as an annual. Both species have similar lance-shaped, stem-clasping leaves, and come from Australia. Seeds may be sown in a sunny border in May; the seedlings being thinned out, not transplanted; or in April if on gentle heat. In the latter case a few seeds should be sown in each pot, and the plants turned out in June with a ball of earth round each root. A foot should be allowed between each two plants.

INULA (the classical name used by Horace). Rigid herbs with erect alternate leaves; bell-shaped involucre, the bracts in several series; florets yellow (rays occasionally white). Principal species: *Inula glandulosa*, introduced from the Caucasus (1804). About 2 feet high, with flower-heads 5 inches across, solitary; July and August. *I. ensifolia* is a smaller plant of neat bushy habit, with a profusion of golden heads $1\frac{1}{2}$ inch across; July to September. Introduced from Austria (1793). Both these plants are hardy perennials, easily grown in any garden soil from seed sown in March, or propagated by divisions.

BUPHTHALMUM (Greek, *bous*, an ox, and *ophthalmos*, the eye). Oxeye. Flower-heads large and showy, yellow, rayed. Principal species: *Buphthalmum salicifolium*, with narrow leaves and large solitary flower-heads; June. Introduced from Austria (1759). *B. speciosa* (*B. cordifolium* of gardens) is 4 feet high, with heart-shaped leaves and bright yellow flower-heads, 3 inches across, with long rays; June to August. Introduced from Hungary (1739). Both hardy perennials of easy culture, propagated in spring or autumn by divisions.

SANVITALIA (named in honour of a Parma family, the Sanvitali). *Sanvitalia procumbens* is a commonly cultivated half-hardy annual of trailing habit, with oval leaves and showy flower-heads with yellow rays and dark purple disk. There is also a "double" variety, in which the

PYRETHRUM ROSEUM

Nat. size

PL. 151

disk-florets have become rayed. They flower in July. The species was introduced from Mexico in 1798. Seeds should be sown in a compost of light sandy loam and peat.

TANACETUM. Tansy. Somewhat shrubby, strong-scented herbs, of which one species is native. Grown chiefly on account of the minutely-dissected foliage. All the florets are tubular, yellow. *Tanacetum vulgare* is grown for garnishing and for use in rustic medicine Its dull yellow corymbs do not entitle it to a place in the garden. *T. leucophyllum*, from Turkestan, has silvery white foliage, and brighter yellow flower-heads. They are perennials, and thrive anywhere, without care.

PETASITES (from Latin, *petasus*, a broad-brimmed hat, in allusion to size of leaves). Butter-bur. *Petasites fragrans*, the Winter Heliotrope, is sometimes grown in the wilder parts of gardens. Its habit is very like that of the Common Coltsfoot, but its flowers are more like those of the Butter-bur, lilac-white or purplish, fragrant; December to February. Will thrive in any rough place. It is naturalised in parts of Britain.

VENIDIUM. A genus of South African herbs, of which one is cultivated—*Venidium calenduluceum*. As its name indicates, its flower-heads are similar to those of the Common Marigold, with clear yellow rays and darker disk; but the two plants are very different. *Venidium* has trailing stems upon which the lobed leaves and upright flowering stems (6 to 12 inches high) occur in tufts. Flowers July to October. It may be grown as an annual by sowing the seed on a hot-bed in March, planting out the seedlings in a sunny position.

ECHINOPS (Greek, *echinos*, a hedgehog, and *opsis*, likeness). Globe Thistles. A large genus of Thistle-like herbs having the flower-heads each containing but one flower, but the heads gathered into dense masses at the ends of the branches, each cluster thus resembling a single flower-head. On dissecting this it will be found that each flower has its own prickly involucre. They are rather coarse-growing plants, but present a fine appearance in shrubberies where there is plenty of room. They grow without special care, and if allowed will become naturalised. Several species are in cultivation, including—*Echinops bannaticus*, introduced from Russia in 1816 under the name of *E. ruthenicus*, a showy border plant, 2 to 4 feet high, with blue flower-heads, and rough, spiny, and downy leaves.

E. Ritro has similar blue flower-globes, but its leaves are not spiny; height 3 feet; native of Mediterranean region, introduced 1570. *E. sphærocephalus* has greyish lilac heads; 2 to 4 feet high; introduced from South Europe (1596). All these species are hardy perennials and summer-bloomers. They are usually propagated by division of the roots. If dried with care the flower-heads retain their forms and colour, so that they may be used for decorative purposes.

CARTHAMUS (Arabic, *gortom*, to paint). Flower-heads surrounded by an involucre of leafy bracts in several series, of which the outermost are broad and spreading with spiny edges, the inner ones becoming narrower, but all terminating in a spiny point. The florets are perfect, and exceed the involucre in length. *Carthamus tinctorius*, the Safflower or Dyer's Thistle, has stiff whitish stems, 2 to 3 feet high, with oval spiny leaves and orange flower-heads; June. Introduced from Egypt as far back as 1551. Cultivated extensively throughout Asia and Southern Europe as a dye-stuff. Seed should be sown in gentle heat in March, and the seedlings transplanted when large enough.

CATANANCHE (from Greek, *katanagkaso*, to compel; the plant being anciently used in love-philtres). *Catananche cærulea* is a free-growing perennial, 3 feet high, introduced from the Mediterranean region about 1596. It has solitary flower-heads on long stalks, and all the florets are strap-shaped, blue; August. A form with blue-and-white flower-heads is known in gardens as *C. bicolor*, but it is a mere colour variety of *C. cærulea*. Another species, *C. lutea*, introduced 1640, is an annual with yellow flowers. It is only about a foot high, and flowers in June. They are both of easy growth and not exacting in respect to soil. Seed should be sown in March or April, and the seedlings pricked out as soon as large enough.

TOLPIS. A genus of South European annuals, somewhat resembling our native Hawkweeds. *Tolpis barbata* is a yellow-flowered, purple-eyed plant, known in our gardens since 1620. It has erect, branching stems, about 2 feet high, and lance-shaped, toothed leaves. The base of the involucre and upper part of the flower-stalk are clothed with awl-shaped bracts. Flowers June and July. *T. umbellata* has similar flowers, but they are considerably smaller and in umbel-like clusters. *T. virgata* is taller with heads entirely yellow. Their place in the garden is in the border. The seed should be sown in spring where the plants are to flower, and the seedlings thinned out.

CAUCASIAN LEOPARD'S-BANE

(DORONICUM CAUCASICUM)

Nat. size

PL. 152

Crepis (classical name for a plant mentioned by Pliny, but not described). A genus comprising about one hundred and thirty species, of which half a dozen are British, and known as Hawk's-beards. The leaves, which are chiefly radical, are very similar to those of the Common Dandelion, which the flower-heads also resemble. The florets are all strap-shaped, and the involucral bracts are slender, mostly equal in size, but with a few smaller ones at their base. Only two species are in cultivation, viz. *Crepis aurea*, a perennial with orange flower-heads, the involucre and flower-stalk covered with long black and small white hairs. It varies from 4 inches to a foot high, and flowers in autumn. Introduced from the Italian Alps (1739). *C. rubra*, an annual, has purple, rosy, or white flower-heads, and bristly involucre; in other respects it is similar to *C. aurea*. Introduced from Italy (1632). *C. aurea* is propagated by seeds or divisions in spring; *C. rubra* by seeds. They prefer a soil that is sandy.

Hieracium (Greek, *ierax*, a hawk). Hawkweeds. A genus of about one hundred and fifty perennial herbs, with many unequal involucral bracts. Florets all strap-shaped, yellow or orange. Several species are native, and the only one cultivated is naturalised locally in the North. This is *Hieracium aurantiacum* ("Grim-the-Collier") with creeping root-stock, entire elliptical leaves and orange-red flower-heads in corymbs; June and July. It is propagated by dividing the rootstock in spring, or by sowing seeds at the same period.

Podachænium is represented in our hothouses by a plant commonly known as *Ferdinanda eminens*, but which is correctly named *Podachænium paniculatum*. It is a tall shrub, 10 or 12 feet high, with large, opposite angular-lobed leaves, a foot or 18 inches long, and small white flowers, grouped in large panicles. As it forms large clumps it should only be grown in large houses, and may be turned outside in summer time. A compost of loam and peat suits it best; it is propagated by cuttings taken in spring, and inserted in sandy soil, covered with a bell-glass and struck in heat.

Palafoxia (named in honour of a Spanish general, José Palafox, 1780–1847). A small genus—about half a dozen species—of erect herbs, natives of Mexico and Florida, with narrow, alternate leaves, and flower-heads in panicled corymbs. Only two species are of horticultural interest:—*Palafoxia hookeriana* and *P. linearis*, plants about 2 feet high. *P. hookeriana* has slender lance-shaped leaves, and loose clusters of rosy-pink flowers; June to August. *P. linearis* is of more shrubby

habit, with very narrow leaves, the margins more nearly parallel, and flesh-coloured flowers; June. They are grown from seeds as half-hardy annuals, sowing in April, and planting out in June.

HELENIUM (the old Greek name). A genus of about eighteen species of hardy herbs, with alternate leaves and large yellow heads, natives of Central and North America. Several species are in cultivation; chief among them is *Helenium autumnale*, growing to a height of 5 or 6 feet, with lance-shaped leaves and large heads of pure yellow; August to October. A strong-growing, showy perennial, introduced from North America (1729). *H. Bolanderi* is a Californian perennial of dwarf habit, with large yellow heads. *H. Hoopesii* is about 2½ feet high, with lance-shaped, stem-clasping leaves, and bright orange heads 2 inches across; June to September. Hardy perennial. *H. nudiflorum* grows 2 or 3 feet high, with slender lance-shaped leaves, and fragrant heads of pure yellow; July to October. This also is a perennial, and there is a variety of it (var. *atropurpureum*) with purple ray-florets. *H. tenuifolium* has very long and slender leaves, yellow flower-heads, and grows only to about 18 inches high. Perennial. These plants are all of vigorous habit, strong-growing, and requiring space, which will be best found in the shrubbery border. The freely-produced large flower-heads are useful for cutting. Propagation by division of the roots and sowing seeds.

DIMORPHOTHECA (Greek, *dimorphe*, two forms, and *theka*, a receptacle; two forms of disk-florets). A genus of about twenty half-hardy South African herbs and shrubs. They are very similar to the genus *Calendula*, from which they differ chiefly in the seeds being straight instead of curved. The principal species is *Dimorphotheca pluvialis*, the Cape Marigold, an annual, growing to a height of about a foot, with weak stems, narrow leaves and flower-heads 2 to 3 inches across. The disk is brown, the ray-florets white above and violet beneath. A singular effect is produced on the approach of rain, for the ray-florets close over the disk, and what was a clump of white and brown flowers a few minutes previously, now appear to have changed to violet. These heads are out from June to September. The seeds should be sown in heat in March, and planted out in well-drained loamy soil about May.

ONOPORDON (the old Greek name, used by Pliny). Cotton Thistles. A genus of hardy herbs, with pinnately-cut or wavy-toothed leaves continued down the winged-stem where this is present, and large heads of flowers with many leathery, spiny bracts. They are natives of Europe,

CINERARIA

(SENECIO CRUENTUS, *var.*)

= Nat. size

PL. 153

North Africa, and Western Asia, one British. Several of them are of stately habit, whilst others are dwarfs. Of the former, two or three are occasionally grown where there is plenty of room to show them off. Our native *Onopordon Acanthium* is one of the best. Its branched woolly stem is 4 or 5 feet high, and the oblong spiny leaves are covered on both sides with white woolly hairs. The flower-heads are about 2 inches across, contracted at the mouth and very cobwebby; the flowers pale purple; July to September. This is a perennial. A larger species (of biennial duration) is *O. arabicum*, which reaches a height of 8 feet, with woolly leaves and stem, and purple heads. It is a native of South Europe, and was introduced in 1686. Another fine biennial from South Europe, introduced 1640, is *O. illyricum*, of similar appearance to *O. Acanthium*, but with stiffer, more branching stem (6 feet high), and more deeply cut and spiny leaves, flowering in July. These plants succeed in almost any garden soil, and may be effectively grown in the rougher, drier parts of a garden, on the edge of a plantation or shrubbery, or to form bold clumps near a lawn. Seeds should be sown in pots in spring, and planted out later.

Silybum (Greek, *sillybon*, the name for a white-spotted Thistle). Milk Thistle. A genus consisting of one species, *Silybum Marianum*, the Blessed, Holy, or Our Lady's Milk Thistle, a South European plant, long naturalised in this country. The stems are not winged like those of *Silybum*, but grooved, and varying from 1 to 4 feet in height. The leaves are large with stout spines, and white nerves. The globose, purple heads are from 1 to 2 inches across, the bracts broad, leathery and spiny: July to September. The white veins of the leaves gave rise to the legend—preserved in the name *Marianum*—that a drop of the Virgin Mary's milk fell upon this plant and stained it. Its presence as a wild plant in Britain is accounted for by the fact that it was formerly cultivated for culinary purposes, the roots and stems being boiled and eaten, the head treated as an Artichoke, and the leaves used in spring salads. Any garden soil will suit it, and it may be grown as recommended for *Onopordon*.

Grindelia (named in honour of David H. Grindel, German botanist, 1766–1836). A genus of about twenty species of shrubby and herbaceous perennials and biennials, natives of North and South America. They have alternate, stalkless or somewhat stem-clasping leaves, and large yellow flower-heads, borne solitarily at the ends of the branches, an inch to 2 inches across. Several species are suitable for garden purposes, though they do not appear to be widely known. *Grindelia glutinosa* is

a shrubby subject, with unbranched stem, 2 feet high, and oval-oblong evergreen leaves. It blooms throughout the year; and the involucral bracts are sticky. It is a nearly hardy perennial, and was introduced from Peru in 1803. The same glutinous secretion will be found on the unopened heads of *G. grandiflora*, a hardy biennial, which has a stem from $2\frac{1}{2}$ to 3 feet high, branching near the top. The heads are about an inch and a half across, and appear from June to September. It is a native of Texas, introduced in 1851. *G. inuloides* is a shrubby plant, with stem about $1\frac{1}{2}$ foot high, and oblong-lance-shaped evergreen leaves, saw-toothed near the end. The flower-heads appear from June to September. Introduced from Mexico (1815). Grindelias succeed best in a compost of loam and peat. They are propagated by cuttings, or divisions of the root, and by sowing seeds in spring or autumn, giving them the protection of a greenhouse or frame.

BACCHARIS (Greek name, from Bacchus, the god of wine, owing to the vinous odour of the roots). A genus of about two hundred species of herbs, shrubs, and small trees, with alternate leaves and terminal flower-heads with usually white rays. They are of less interest horticulturally than in popular medicine in their native countries, which are all on the American continent. *Baccharis halimifolia*, however, is occasionally found in gardens, and is known as the Groundsel Tree. It is a shrub growing to a height of from 6 to 12 feet, with angular branches and oblong-wedge-shaped, coarse-toothed leaves. The flower-heads contain all male or all female florets; they are white, but the female heads are the handsomer on account of the conspicuous silvery pappus. They flower in July. This species was introduced from the Northern United States in 1683. It is quite hardy, and is propagated by cuttings. Ordinary garden soil will be found to suit it.

SANTOLINA (probably from *Santonica*, a classical name). A genus of about eight species of fragrant, hardy, sub-shrubs from the Mediterranean region. They are allied to *Achillea*, but the flower-heads have no rays, and the base of the corolla-tube is prolonged into a kind of hood which envelops the summit of the ovary. The best-known species is *Santolina Chamæcyparissus*, the Cotton Lavender, which was introduced from South Europe in 1573. It is a small branching bush about 2 feet high, clothed with hoary down. The twigs are wiry, and densely covered with very slender leaves, which are beset with four or six rows of projecting teeth. The yellow flower-heads are solitary at the end of the twigs, and appear in July. The var. *incana* is similar, but dwarf, and covered with silvery down. *S. alpina* is a prostrate species with

SCARLET CACALIA

(EMILIA SAGITTATA)

Nat. size

PL. 154

erect flower-stems and deeply-cut leaves. *S. fragrantissima* has the flower-heads disposed in corymbs instead of solitary. They are propagated by sowing seeds as soon as ripe; or by dividing the root or taking cuttings in spring.

ATHANASIA (Greek, *a*, not, and *thanatos*, death; in allusion to the endurance of the flower-heads). A genus consisting chiefly of greenhouse evergreen shrubs from South Africa. *Athanasia capitata* is about 1½ foot high, with leaves cut pinnately and covered with white down when young. The flower-heads, which appear in March, are yellow. Introduced from South Africa (1774). *A. pubescens* grows to a height of 6 feet, and the oblong leaves are either entire or divided into three lobes: when young they are covered on each side with soft hairs. Flower-heads yellow; July. Introduced from South Africa (1768). They are propagated by cuttings from the half-ripened wood in spring, inserted in sand, and covered with a glass. The best soil is a compost of loam and peat in the proportion of three to one.

LONAS (derivation unknown). A genus containing only one species, formerly included in *Athanasia*. This is *Lonas inodora*, an annual herb with much-branched furrowed stems, a foot high, and fleshy leaves, pinnately cut. The yellow flower-heads are clustered in corymbs on long foot-stalks, and the florets are all tubular; July to October. Introduced from Barbary (1686). It is not a neat-growing plant, but it is deserving of a place on account of its easy culture in ordinary garden soil, and the long-continued freshness of its flower-heads. It is propagated by seed sown in spring.

WAITZIA (named in honour of F. A. C. Waitz, a writer on the botany of Java). A genus of about six species of greenhouse annuals, natives of Australia, with alternate slender leaves, and "everlasting" flower-heads in terminal corymbs or racemes. The florets are all tubular, five-toothed, surrounded by many series of petal-like coloured bracts. *Waitzia aurea* has a branching stem, 1 to 2 feet high, and long, slender, stem-clasping leaves. Flower-heads golden yellow, sometimes tinged with brown, in corymbs; June to September. Introduced 1835. *W. corymbosa* is similar, but covered with rough down, and the flower-heads are either light or dark yellow, white or pale pink, in a denser corymb. Introduced 1864. *W. grandiflora* has much larger, bright yellow flower-heads. Introduced 1863. *W. nivea* is not quite so tall, and has large white, pink, or pale yellow bracts, no longer than the florets, in a few-headed, loose corymb. Introduced 1836. *W. steetziana* does not attain a foot in height, and the pure white or yellow heads

are only about half an inch across. Introduced 1861. Cultivation as directed under COCKSCOMB, which see.

AMMOBIUM (Greek, *ammos*, sand, and *bios*, life: in reference to its sandy habitat). A genus consisting of two species of Australian "everlastings," differing from all the others in having toothed, chaffy scales upon the *receptacle*, between the florets. *Ammobium alatum* has winged stems, 1½ to 2 feet high, springing from a rosette of oblong-lance-shaped leaves. The bracts of the flower-heads are silvery white, the florets yellow, the entire head about an inch across; May to September. Introduced from Holland (1822). There is a var. *grandiflorum*, with flowers 2 inches across, of a purer white: it comes true from seed. It is a perennial, but is best treated as a biennial, the seed being sown in the greenhouse in September, and the seedlings kept there until late in spring, when they may be planted outside in any good soil.

HUMEA (named in honour of the wife of Sir Abraham Hume). A genus of four Australian herbs and shrubs, with alternate entire leaves, and numerous small flower-heads in dense corymbs or loose panicles. The principal species is *Humea elegans*, an ornamental biennial herb, 5 or 6 feet high, with large stem-clasping, oblong or lance-shaped leaves, and minute brownish red, pink, or crimson flower-heads in an immense, loose, drooping-branched panicle; July to October. Introduced from New South Wales in 1800. *Humeas* are tender plants, and should be grown in a greenhouse, but may be planted out in summer. *H. elegans*, from its tall, graceful, drooping habit, makes a good subject for the centre of a bed, or the back of a border. Seed should be sown about July, in fine light soil, placed in a cool frame. The seedlings should be potted as soon as they can be handled, in a light soil in small pots, and, when these are well filled with roots, repotted in a rich compost of loam and well-rotted manure, to which a little charcoal has been added. They should be given plenty of light and air, and grown on until the winter, when they should be allowed to rest, and be kept nearly dry. When planted out in summer they must be secured to stakes and sheltered from strong winds.

ARNICA (Greek, *arnakis*, lambskin: texture of leaf). A genus of hardy, dwarf, perennial herbs, distinguished from *Senecio* by the involucre being bell-shaped, with the bracts in two series. The principal species are *Arnica chamissonis*, a North American species growing from 1 to 2 feet high, with oblong-lance-shaped woolly leaves, and showy yellow flower-heads 1½ to 2 inches across; June to September.

MARIGOLD

(CALENDULA OFFICINALIS)

Nat. size

PL. 155

A. foliosa has a creeping rhizome, from which arise the stems to a height of 1 or 2 feet. The leaves are lance-shaped, smooth; flower-heads pale yellow, about an inch across, in three- to seven-headed corymbs; August. Native of United States. *A. montana*, or Mountain Tobacco, is a pretty European alpine, with a rosette of smooth, radical leaves, oblong-lance-shaped, from which spring the few-leaved flowering stems, each with three or four yellow heads about 2 inches across; July. Introduced 1731. From the roots and leaves a valuable tincture is prepared, much used externally for bruises and sprains, as well as internally in cases of low fever and paralysis. *A. scorpioides* is another European species, introduced 1710, from 6 to 12 inches high, with broad, oval leaves and large yellow heads, one to three on a stem; June to September. Propagated by division of roots in spring, or sowing seeds in cold frame at same period. The best compost is one of loam, peat, and sand.

ARCTOTIS (Greek, *arktos*, a bear, and *ous*, an ear: shaggy fruit). A genus of South African perennial herbs, distinguished by the numerous involucral bracts, and the bristles between the florets. The principal species are: *Arctotis acaulis*, with a very short stem, and hoary, lyre-shaped leaves in threes. The flower-heads are yellow and red; June to September. Entire plant about 4 inches high. Greenhouse perennial, introduced 1759. *A. arborescens* has a branching stem, 2 feet high, and narrow-oblong, pinnate leaves. The flower-heads are large, the disk yellow, and the rays white above, pink beneath; June to September. Evergreen undershrub, introduced 1815. *A. grandiflora* has pinnately-cut, saw-toothed leaves, and orange heads, the outer bracts turned back and somewhat cobwebby; July. A biennial, about 18 inches high; introduced 1710. *A. speciosa* is a stemless plant, very similar to *A. acaulis*, but more shrubby, with the upper side of the leaves smooth, and the outer series of bracts slender, with their edges turned back. Introduced in 1812. These plants all require greenhouse protection, except in summer, when they may be planted out in the driest and sunniest part of the garden. They are of easy culture as pot-plants, if grown in a compost of loam and leaf-mould. They are propagated by means of cuttings, which may be taken at any time, and inserted in sandy soil in a warm house. They must be kept rather dry, as there is a strong tendency for them to rot before rooting; for this reason they should not be covered with hand-light or bell-glass, but allowed plenty of air.

MUTISIA (named in honour of Celestine Mutis, a South American botanist, 1732–1808). A genus of about thirty-six species of erect or

climbing shrubs, natives of South America and Brazil. They are distinguished by their irregular florets, most of them two-lipped. The leaves are alternate, entire, or pinnately-divided, and the heads are solitary and terminal. *Mutisia arachnoidea* (also known as *M. speciosa*) is a stove climber, with pinnate leaves, and oval-lance-shaped leaflets, ending in a long branching tendril. Flower-heads red; July. Introduced from Brazil (1824). *M. Clematis* is a more hardy climber, the angular stem reaching a height of from 20 to 30 feet. The compound leaves consist of from fourteen to eighteen leaflets, ending in a branched tendril. The large flower-heads are of a rich red hue. Introduced from New Grenada in 1859. *M. decurrens* has several slender, twining stems, and lance-shaped, glaucous, tendrilled leaves. The deep orange flower-heads measure from 4 to 6 inches across; June to August. Native of Chili. *M. latifolia* has the tall climbing stem furnished with broad leafy wings. The leaves are heart-shaped, with spiny teeth, woolly beneath, stalked. Flower-heads pink and yellow; August and October. Introduced from Valparaiso (1832). Hardy. *Mutisias* should be grown against a south wall in a good loamy soil. The more tender kinds in the border of stove or greenhouse. Propagation is effected by taking cuttings, late in spring, from the partly-ripened shoots. These should be struck in sand with gentle bottom heat and covered with a bell-glass.

PROUSTIA (so called in honour of a Spanish chemist named Proust). A small genus—only six or seven species—of stove or greenhouse shrubs, natives of South America and Mexico. There is only one species in cultivation—*Proustia pyrifolia*, a greenhouse climber with leathery, heart-shaped or oval leaves, woolly beneath. Flower-heads white, with a beautiful rosy-pink or purple pappus. It was introduced from Chili, 1865, and should be treated the same as a greenhouse *Mutisia*.

POLYMNIA (*Polyhymnia*, the name of one of the Muses). A genus of about a dozen rough, coarse-growing herbs, shrubs or trees, not so much esteemed for their flowers as for their foliage. The leaves are opposite, or the upper ones alternate, often large or deeply lobed. The flower-heads are yellow or yellowish, in terminal corymbs, with several small bracts, below which are five larger leafy ones. The ray-florets are female, producing oval achenes without any pappus-hairs; the disk-florets all male. They are all natives of America. The best-known species are: *Polymnia canadensis*, a hardy perennial herb, 6 feet high, introduced 1768; with the lower leaves cut deeply and pinnately, whilst the upper

GAZANIA SPLENDENS

$^{2}/_{3}$ Nat. size

PL. 156

ones are five-lobed or angled. The flowers small, with a few short whitish yellow rays, shorter than the involucre; July. *P. edulis* is a tall, coarse-growing, hardy perennial, with yellow flower-heads; cultivated in the Andes for the sake of its edible Dahlia-like tubers. *P. pyramidalis* is a rapid-growing, tree-like perennial, with woody stems 10 feet high; large heart-shaped leaves, broader than long, and cymes of yellow-rayed flower-heads with brown disks; flowering from July to October. Half-hardy. Introduced from Columbia (1867). *P. Uvedalia* is a hardy perennial herb, growing to a height of from 4 to 10 feet, with palmately lobed lower leaves, the upper ones broad-oval, angled and toothed, almost stalk-less. The flower-heads have very large outer involucral scales, ten to fifteen yellow narrow rays; September. Introduced from the United States (1699). Polymnias will be found most serviceable in the South of England, where they are used in sub-tropical gardening. They are pro-pagated by divisions of the roots, by cuttings, and by seeds. Seeds should be sown in heat at the very beginning of the year, and the seed-lings potted in rich loamy soil until June, when they may be planted out in deep, well-manured soil, in a sunny position. Old plants should be divided in March or April; and cuttings should be taken in January, inserted in sand, and struck in gentle heat.

DAMPIERAS

Natural Order GOODENOVIEÆ. Genus *Dampiera*

DAMPIERA (named in honour of Wm. Dampier, the circumnavigator). A genus of about thirty species of alternate-leaved greenhouse shrubs or under-shrubs, few of which are cultivated here. The calyx is very small, the corolla two-lipped, and the five stamens have the anthers cohering. The style ends in a little cup, at the base of which is the stigma. They are all natives of Australia.

Principal Species.

DAMPIERA BROWNII (Brown's). Stem sub-shrubby, erect, somewhat woolly, 1 to 2 feet high. Leaves oval, rough above. Flowers blue, the corolla densely clothed with black feathery hairs; July. Introduced 1824. Perennial.

Cultivation.

The most suitable soil for *Dampiera* is a compost of turfy loam, peat, and sand. Propagation is effected by cuttings taken in spring, and struck in similar soil, under a bell-glass.

GOODENIAS

Natural Order GOODENOVIEÆ. Genus *Goodenia*

GOODENIA (named in honour of Bishop Goodenough, of Carlisle, 1743–1827). A genus of about seventy species of greenhouse herbs, shrubs or sub-shrubs, with radical or alternate leaves, distinguished by the five-parted calyx, the tubular two-lipped corolla cleft in the back, and the five anthers cohering until the flower opens. Stigma as in *Dampiera*. Species restricted to Australia.

Principal Species.

GOODENIA GRANDIFLORA (large-flowered). Stem herbaceous, 3 to 4 feet high. Leaves oval-lance-shaped, toothed. Flowers large, yellow with purple streaks; July. Introduced from New South Wales (1803).

G. OVATA (egg-shaped). Stem erect, shrubby at the base, 2 to 4 feet high. Leaves oval or broad-lance-shaped. Flowers yellow; July. Introduced 1793.

G. STELLIGERA (starry). Stem erect, few-leaved, 1 to 1½ foot high. Leaves thick, very slender. Flowers yellow; corolla hairy outside; June. Perennial, introduced 1823.

Cultivation as suggested for *Dampiera*.

LESCHENAULTIAS

Natural Order GOODENOVIEÆ. Genus *Leschenaultia*

LESCHENAULTIA (named in honour of L. T. Leschenault, 1773–1826, a French botanist and traveller). A genus of sixteen species of greenhouse herbs, shrubs and under-shrubs, with oblique corollas with erect lobes, and the tube slit to the base: including some of the most effective of greenhouse shrubs. The species are all natives of Australia alone.

Principal Species.

LESCHENAULTIA BILOBA (two-lobed). Stem branched, shrubby, a foot high. Leaves slender. Flowers blue; segments of corolla deeply-two-lobed with a point between them; June to August. Introduced 1840. The var. *major* is larger than the type in all respects. Also known as *L. Drummondi* and *L. grandiflora*.

L. FORMOSA (handsome). Stems shrubby, 1 foot high. Leaves very slender, parallel-sided. Flowers scarlet, drooping, solitary in the

axils; upper lip entire, lower three-parted; June to September. Introduced 1824. Also known as *L. Baxteri*, *L. multiflora*, and *L. oblata*.

L. LARICINA (Larch-like). Stem branched, shrubby, a foot high. Leaves thread-like, compressed, pointed. Flowers scarlet; corolla-tube hairy at bottom; segments spreading two-lobed; in three- to five-flowered corymbs; June to August. Introduced 1844. Also known as *L. splendens*.

L. LINARIOIDES (Toadflax-like). Stem branched, shrubby. Leaves thread-like. Flowers large, yellow, terminal; three of the corolla segments large and divided, two smaller entire; August. Introduced 1844. Also known as *L. arcuata* and *Scævola grandiflora*.

Cultivation. *Leschenaultias* must be kept entirely in the greenhouse, and should be grown in well-drained fibrous peat and silver sand, which must not be allowed to get dry. They are propagated by means of cuttings, the ends of moderately firm shoots being used for the purpose, and inserted in sandy peat under a bell-glass. This should be done about May, and the cuttings should be placed in gentle heat, but shaded from the sun. After the cuttings are well rooted, they should be repotted, and placed in a close frame until they have become again established, when they should be removed to a light, sunny and airy position in the greenhouse. None but soft water may be given to them, and not too freely. After flowering, the plants should be overhauled, and with a view to retaining good form the shoots should be stopped where necessary.

END OF VOLUME II.

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